

An identity in transition:

A longitudinal study examining students' mathematical  
identity across the transition from primary to post-primary  
school

John Behan, B.Ed., M.Ed.

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Dublin City University

School of STEM Education, Innovation & Global Studies

Supervisors: Dr Lorraine Harbison, Prof. Brien Nolan, Dr Thérèse Dooley

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# Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

Signed: John Behan

Candidate ID No.: 20210637

Date: 15/08/2025



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## List of Abbreviations

CARPE	Centre for Assessment Research, Policy and Practice in Education
CBAs	Classroom-Based Assessments
CIC	Common Introductory Course
DE	Department of Education
DES	Department of Education and Skills
ESRI	Economic and Social Research Institute
GUI	Growing up in Ireland
INTO	Irish National Teachers' Organisation
NAMER	National Assessments of Mathematics and English Reading
NCCA	National Council for Curriculum and Assessment
NCSE	National Council for Special Education
NRC	National Research Council
OECD	Organisation for Economic Co-operation and Development
PISA	The Programme for International Student Assessment
PJG	Personal journey graph
SEN	Special educational needs
Sten	Standard ten
STEM	Science, Technology, Engineering and Mathematics
TIMSS	Trends in International Mathematics and Science Study

# Abstract

## **An identity in transition: A longitudinal study examining students' mathematical identity across the transition from primary to post-primary school**

**John Behan**

The transition from primary to post-primary school is a crucial time in a student's journey as a mathematical learner. While this transition has been widely studied, much of the existing research, particularly in the Irish context, has focused on tracking mathematical performance or gathering insights from teachers. Little is known about what happens to students' mathematical identities during this transition. This qualitative longitudinal study sought to address this gap, foregrounding student voice and examining their mathematical identity journeys.

Using a sociocultural theoretical lens, the research conceptualises mathematical identity as fluid, socially constructed and narratively expressed. 17 students were followed over an 20-month period, with their experiences captured through semi-structured interviews and personal journey graphs. A dual analysis was employed; the Listening Guide was used to conduct a voice-centred analysis of three illustrative student narratives, while thematic analysis was applied to data from all 17 students.

The findings highlight the transition as a multifaceted process involving overlapping "mini-transitions" that often extended beyond First Year. It emerged as a period of significant identity negotiation marked by confidence, doubt and adjustment, as students navigated through a complex array of changes. A pattern of silent acceptance emerged, with many students quietly adjusting to distinct changes in their learning experiences without voicing discomfort. Key influences on their identity included the role of the teacher, assessment practices, peer comparisons and learning continuity. The study contributes to growing research on mathematical identity by illuminating its relational nature. It shows how students reconfigure their sense of self as mathematics learners in response to social and institutional shifts. The research calls for responsive pedagogies and more holistic transition supports that recognise identity work as central to mathematics learning. It calls for educational policies that foreground student voice and position mathematical identity alongside mathematical achievement in terms of importance.



# Chapter 1: Introduction

The transition from primary to post-primary school has long been recognised as a pivotal moment in a student's educational journey. Steed and Sudworth (1985) memorably described it as a humpback bridge, "traditional in structure; it survives because the volume of traffic wanting to cross is not sufficient to generate demands for change to a more efficient form of bridge" (p. 23). This analogy captures the limited visibility students often face as they approach this transition. They cannot see what lies beyond, so any judgements are based on speculation, hunches or, at best, informed guesswork. Intriguingly, the metaphor also invites a mathematical reading. The shape of the bridge itself offers much to discuss, with the incline and decline forming a central arch, usually narrow in nature. And it is with a mathematical focus that this study is built. Like the features of a humpback bridge, its incline, decline, speed, time and distance, students experience this transition with varying momentum and trajectories. As they make the move from primary to post-primary school, some move smoothly, others encounter resistance and many experience moments of uncertainty, acceleration or delay. This study sets out to understand how students experience mathematics across the transition, focusing on their mathematical identity journeys during this time.

This opening chapter sets out the context and rationale for the study. It addresses the importance of mathematics in students' broader educational experiences, outlines the national educational landscape in which the research is situated and explains why this transition period warrants closer investigation. The study's aims and research questions are then presented, alongside a brief overview of the theoretical and methodological approach, and the thesis structure.

## 1.1 The importance of mathematics

Mathematics can be understood as a way of thinking and seeing the world. From everyday activities like cooking, shopping, travelling and managing money, providing tools for navigating daily life. Mathematics plays a central role in finance and economics, and forms the basis for technological advances in software and computing (Lindquist et al., 2019). The COVID-19 pandemic further highlighted its importance in scientific research, public health modelling and statistical analysis. Beyond this, mathematics underpins many professions, from medicine to architecture, ecology and engineering. Within education, mathematics does more than support future careers; it fosters critical thinking, problem solving and evaluate information in an increasingly data-driven world. Mathematics equips students with conceptual and practical tools that shape how they see themselves as learners and participants in society. It is not only a

subject of academic importance but a space where student confidence, self-concept and identity are actively formed and negotiated.

## **1.2 The transition from primary to post-primary school**

The transition from primary to post-primary school has long been of interest to mathematics education researchers. While this interest dates back several decades, momentum has grown since the 1990s, particularly in the Irish context over the past ten years (e.g. O'Meara et al., 2019; Ryan et al., 2024; Prendergast et al., 2019; Martinez-Sainz et al., 2025). Despite this expanding body of research, the transition remains a complex period that continues to intrigue researchers, educators and policymakers worldwide (Jindal-Snape et al., 2020).

Cantley et al. (2020) offer a framework for understanding mathematics learning across the transition, structured around five domains: civilisation, society, school, pedagogy and curriculum. Their work reinforces the layered complexity of learning during this period. Set during a time of significant physical and emotional development, this transition presents adolescent students with a myriad of new experiences and potential tipping points (Tilleczek, 2007). Hargreaves et al. (1996, p. 35) recognise the “triple change” that students face during this time; changes that are social, physical and intellectual in nature. Reflecting its importance, Zeedijk et al. (2003) point out that the transition is one of the most difficult in the student's educational career, with potential long-term consequences for both academic success and wellbeing. In a large Australian study, students who experienced a difficult transition were more likely to report poor social and emotional health at the end of First Year, including increased depression and anxiety (Waters et al., 2012). Similar concerns are echoed by White (2020) who links transition challenges to declines in mental health and wellbeing. At the same time, the transition holds potential to support growth and resilience. As Jindal-Snape et al. (2020) emphasise, the move can positively foster wellbeing under the right conditions. Furthermore, a positive experience of transition can offer a solid footing in areas of achievement, behaviour and belonging (Rice et al., 2015).

In mathematics education specifically, Irish research has also shown that how students navigate the transition influences their engagement (Smyth, 2017) and academic performance (Ryan, 2018). As they encounter new expectations and experiences (O'Meara et al., 2020), the move to post-primary school can reshape their perceptions of mathematics and their ability to succeed. Internationally, research further suggests that this period prompts students to reconsider what it means to be a mathematical learner (Darragh, 2013). The transition, then, can be understood as a site where one's mathematical identity is actively negotiated.

## **1.3 The national context**

Before outlining the specific rationale and focus of this research, it is important to situate it within the wider educational context in Ireland. The following sections summarise recent developments in mathematics curriculum and pedagogy, student achievement data and policy approaches aimed at supporting the transition from primary to post-primary education.

### ***1.3.1 Curriculum and policy developments***

In the Irish context, the past fifteen years have seen significant changes linked with mathematics curriculum. At post-primary level, in 2010, the Project Maths syllabus was introduced, aiming to emphasise problem-solving, context and application. Eight years later, the Project Maths initiative was replaced by a new Junior Cycle mathematics syllabus (Department of Education and Skills [DES], 2018a). Such changes have direct implications for transition supports in the area of mathematics, which will be outlined further below. At primary level, a new curriculum was published in 2023 (Department of Education [DE], 2023a), with professional development for teachers still being rolled out.

At policy level, 2011 witnessed the launch of a national numeracy and literacy strategy (DES, 2011a), which aimed to raise standards in both these areas. The interim review of the strategy (DES, 2017a) examined national and international assessments data of Irish students in the relevant areas, and set new increased targets up to 2020. Replacing this strategy, a new Literacy, Numeracy, and Digital Literacy Strategy was published in 2024 (Government of Ireland, 2024). This strategy will guide national priorities across these domains for the coming decade. While these curriculum and policy shifts demonstrate an active national commitment to improving mathematics education, they also highlight the need for attention to continuity and coherence across educational levels. The timing of this study is therefore particularly significant, situated following the revised Junior Cycle mathematics specification (DES, 2018a) and the new Primary Mathematics Curriculum (DE, 2023a). This positioning captures student experiences during a period of curriculum flux, offering insights that may inform alignment across sectors.

### ***1.3.2 International assessments***

Ireland's performance in international mathematics assessments has remained strong over the past decade. In the most recent Trends in International Mathematics and Science Study (TIMSS), Irish students performed significantly above the international average in Fourth Class and Second Year (McHugh et al., 2024). Notably, the Second Year results were the highest of all European Union countries. The scores showed no significant change since 2015. Similarly, the most recent Programme for International Student Assessment (PISA) report indicates that Irish

15-year-olds continue to perform above the Organisation of Economic Co-operation and Development (OECD) average in mathematics (Donohue et al., 2023). While Ireland's 2022 PISA results did decrease somewhat since 2018, this decrease was less than the average decrease experienced by OECD countries. However, these headlines mask important underlying trends. Both TIMSS and PISA data show relatively low proportions of Irish students achieving at the highest performance levels when compared with other jurisdictions. In PISA 2022, for example, the number of students performing at the top proficiency bands was significantly below the OECD average (Donohue et al., 2023). At the same time, Ireland had a significantly lower proportion of "low-performing students" than the OECD average, resulting in a narrower spread of attainment.

Beyond achievement, attitudinal data also raise important issues. While recent TIMSS reports have not yet published full attitudinal findings, data from TIMSS 2015 showed that 77% of Irish Fourth Class students had a positive attitude towards mathematics (Perkins et al., 2020). However, by Second Year, this figure dropped below 50%, with a notable gender gap emerging. Boys were significantly more likely than girls to report positive attitudes. While this trend was mirrored internationally, the decline among Irish girls exceeded the TIMSS average.

### ***1.3.3 The transition from primary to post-primary in Ireland***

The Irish education system comprises four main stages: early years, primary, post-primary and further/higher education. Education is compulsory from age six to sixteen, or until students have completed three years of post-primary school. Primary education spans eight years, from Junior Infants to Sixth Class. Students then progress to post-primary education, beginning with First Year. Each year, around 65,000 to 70,000 students undertake the transition (DES, 2018b), usually between the ages of 11 and 13. For the vast majority of students, the move to post-primary school means they go from becoming the oldest in a primary school to the youngest in a post-primary school. The move also involves obvious changes such as, typically, an increase in the size of the school, the number of teachers and the number of subjects. A notable feature of the Irish system is the relatively high number of primary schools, with recent statistics showing a total of 3,095 primary schools in the state, compared with 727 post-primary schools (DE, 2023b). Occasionally, students undergo an additional transition within the primary sector itself, particularly where schools are divided into separate junior and senior schools. In these cases, students may already have experienced an institutional move before reaching Sixth Class, potentially adding further layers to their educational journey.

### *1.3.4 Supporting transition in Mathematics*

The transition from primary to post-primary mathematics has periodically received policy attention in Ireland, though efforts have varied in scope and implementation. A landmark moment came in 2004 with the publication of a national study by the Economic and Social Research Institute (ESRI) (Smyth et al., 2004), which made a series of recommendations to support smoother transitions. These included the development of a preparation module for students in Sixth Class, a national mentor training policy for post-primary schools and shared components in initial teacher education, with information on the curriculum at both levels. Moreover, the authors call for greater cooperation between primary and post-primary sectors in terms of curriculum and teaching methodologies, including a framework detailing the curriculum covered at primary level to support post-primary teachers to plan learning. In the intervening years, some of these recommendations have been taken on board, while others have not.

A targeted intervention emerged with the introduction of Project Maths in 2010. As part of this reform, a Bridging Framework was launched with the aim to support a smoother transition in the area of mathematics. It included three key components: a Common Introductory Course (CIC) for First Year, a bridging content document and a glossary to promote curricular coherence (DES, 2013). The CIC outlined the minimum mathematics content to be covered over the course of First Year. It set out to “lay the foundation for conceptual understanding which learners can build on subsequently,” (DES, 2013, p. 33) revisiting topics covered in the final two years of primary school, while also introducing students to elements from all five strands of the Junior Certificate syllabus.

While no standalone study was conducted to measure the effectiveness of the framework, a review of the impact of Project Maths on academic achievement did provide some data from teachers regarding its perceived effects (Shiel & Kelleher, 2017). Teacher focus groups revealed that teachers welcomed the CIC’s flexibility, but cited limited class time, the level of preparedness among incoming students and large group sizes as hindering differentiation (Shiel & Kelleher, 2017). Additionally, teachers expressed fears that the CIC did not effectively challenge the higher achieving students which led to disengagement, a finding echoed by an initial report on Project Maths conducted by the National Council for Curriculum and Assessment (NCCA) (NCCA, 2012). Indeed, the authors called for clarity as to the scope and role of the CIC, as well as to the level of flexibility it afforded teachers. Alongside these concerns, awareness of the Bridging Framework remained low. A national survey by Prendergast et al. (2019) found that 90% of primary and 72% of post-primary mathematics teachers were unaware of its main

components. While some post-primary teachers viewed the CIC positively (Cosgrove et al., 2012), it was rarely adopted and is no longer in use.

While limited follow-up on the recommendations from the ESRI's seminal 2004 report is a cause for concern, recent years have nonetheless seen some positive developments, particularly in the transfer of information between both sectors. The Education Passport facilitates the transfer of information from primary to post-primary schools, aiming to support learning continuity (DES, 2014). Additionally, the most recent Statement of Strategy from the DE includes a commitment to effective transitions across all stages of the education system (DE, 2021). Within recent curriculum change, this area has also gained prominence. For example, 'Transitions and Continuity' sits as one of the key principles within the *Primary Curriculum Framework* (DE, 2023c), acknowledging that students' learning identities must be nurtured across the transition.

Notwithstanding these developments, there is limited evidence that the mathematics transition is currently a sustained focus within national policy. It could be considered disappointing and perhaps surprising that within the objectives and actions of the recently published Literacy, Numeracy and Digital Literacy Strategy (Government of Ireland, 2024), the transition is not referred to. Similarly, there is no reference to the transition in the STEM Education Policy Statement 2017-2026 (DES, 2017b), which sets out a roadmap for action and improvement in all science, technology, engineering and mathematics (STEM) related areas. Alongside the discontinued Bridging Framework, this could signal a loss of momentum between broader educational priorities and the targeted focus needed to ensure continuity in mathematical learning during this pivotal time for students.

#### **1.4. Call for the study**

While the transition from primary to post-primary school has received considerable national and international attention, the paucity of literature which focuses on the voice of students themselves has been noted (Waters et al., 2014a). In a systematic review of literature on the primary to post-primary transition, the authors highlight that the voice of students is underrepresented in this space and argue for "the need for communication with children rather than about children" (van Rens et al., 2018, p. 55). Such findings signal the need to prioritise students' voices during this phase of their education journey. Galton and McLellan (2018) remind us that students have first-hand relevant knowledge and experience of what it is like to make the transition from primary to post-primary school and urge stakeholders to give their voices more consideration.

Students' relationships with mathematics are central in mathematics education research (Black et al., 2009). Specific to the primary to post-primary transition, Ryan (2018) has called for evidence-based research into the causes and remedies of declining mathematical performance across this time. Meanwhile in her Australian study, Attard (2010) has similarly argued that student perspectives on the mathematical learning process during this period remain underexplored. She notes the scarcity of research that captures student motivation and voice, particularly as they adjust to new expectations and environments in post-primary school.

Another consideration is the type and time span of data collected. In their systematic review of literature in the area, Jindal-Snape and Cantali (2019, p. 1256) note the limited research that focuses on the "holistic transition experiences of children over time, with previous research concentrating on the period immediately before and/or after the transition". A lack of robust longitudinal studies in the area makes labelling any specific causes for dips in achievement levels very difficult to discern (Jindal-Snape et al., 2019). Similarly, in a review of literature on the primary to post-primary transition, Tilleczek (2007, p.6) similarly advocates for "long-term qualitative research" to "more adequately map out processes, experiences, narratives, and meanings of transition over time". In alignment with these calls, Jindal-Snape et al. (2020) emphasise the importance of collecting data over several school years to generate meaningful insight into students' varying transition journeys. The need for such an approach is also reflected in findings from the Growing Up in Ireland (GUI) study, which noted a dip in student engagement by Second Year in post-primary education (Smyth, 2017), a finding that raises questions about how students' early experiences in post-primary school shape their relationships with mathematics.

To better understand students' experiences of this transition, this study places particular emphasis on their mathematical identity and how students see themselves in relation to mathematics. Identity offers a powerful lens through which to explore the affective and relational dimensions of learning that are often overlooked by measures of performance alone. Mathematical identity, explored more thoroughly across the following two chapters, has been theorised as socially constructed, relational and shaped by classroom practices, peer comparison and affective experiences (Boaler & Greeno, 2000; Darragh, 2016). Yet research tracking how students' identity is negotiated during an educational transition remains scarce, particularly research that is longitudinal in nature and foregrounds the voice of students. In a recent study in Norway, having examined students' mathematical identity before their move to post-primary school, the authors call for future research to delve more deeply and examine identity construction in a longitudinal sense (Pettersen & Xenofontos, 2023). As students move through

the transition, they navigate new environments and further develop a sense of who they are as mathematics learners. Focusing on identity allows for a deeper engagement with students' voices, revealing insights about their learning and how they come to understand themselves within the subject. This focus is further developed in Section 1.5.2 and forms a core concern throughout the thesis.

## **1.5 Aims of the study**

Responding to the identified research gap, this study explores students' mathematical identity journeys across the transition from primary to post-primary school. The research seeks to foreground student voice in order to develop a richer understanding of how students navigate mathematics during this pivotal period. Thus, the following are the aims of the study:

### **1. Explore mathematical identity across the transition.**

This aim focuses on developing an in-depth understanding of what students' relationships with mathematics looks like as they move from primary to post-primary school. Using the lens of mathematical identity, the study explores how students narrate and negotiate their sense of self in mathematics amid the social, emotional and contextual changes brought about by the transition.

### **2. Increase knowledge and understanding on the impact the transition from primary to post-primary school has on students' relationship with mathematics.**

This aim seeks to contribute to the knowledge base regarding the transition and what impact it has on students' relationships with mathematics. This study offers a longitudinal investigation that seeks to generate deeper insight into how students respond to the wide-ranging changes brought about by the transition.

### **3. Provide a voice for students making the transition from primary to post-primary in the Irish context.**

In addressing this aim, the study prioritises the voice of students. As first-hand participants in the transition process, the study seeks to understand what matters to them during this time of change. In foregrounding student voice, the research highlights how students themselves interpret and make sense of their evolving relationship with mathematics. Seeing the transition from the perspective of students is paramount as what is consequential for them may not be consequential for other stakeholders in the process.

### *1.5.1 Research questions*

Sitting underneath the study's aims, the study is guided by the following research questions:

1. What is the nature of the mathematical transition students undertake as they move from primary to post-primary school?
2. What do students' mathematical identity journeys look like across the transition journey from primary to post-primary?
3. What factors influence students' mathematical identity during the transition from primary to post-primary school?

### *1.5.2 Framing the study through mathematical identity*

These questions are explored through the conceptual lens of mathematical identity, which offers a powerful framework for interpreting how students' experiences evolve across the transition. As reflected in the literature, the transition from primary to post-primary is a very complex time for students, with social, personal, environmental and learning factors at play. In analysing students' relationship with mathematics at this time, mathematical identity emerges as a very fitting theme. While Goos and Bennison (2019) state "the usefulness of the notion of identity for exploring learners' relationship with mathematics" (p. 405) is widely recognised, the entity is still relatively new in the field of mathematical research. In terms of mathematical learning, students' mathematical identity is considered an important affective factor that has been shown to be predictive of one's engagement with mathematics (Bishop, 2012). Separately, Black and colleagues (2010) propose that learners' identity greatly influence how they learn, as well as the type of relationships they develop with mathematics.

Chapter 2 explores alternative affective domains including engagement, motivation, attitudes, mathematical anxiety and self-efficacy. While all appear relevant at this time for students' mathematical learning, mathematical identity offers the opportunity for a deeper focus on their relationship with the subject. Educational transition can afford students an opportunity to create new identities (Hernandez-Martinez et al., 2011), with Ecclestone and colleagues (2010) asserting that educational transition "is seen as a process of change that involves identity, not just a shift from one location to another" (p. 82). Elias (2002) goes further, viewing an educational transition as a destabilising time for students that requires them to re-assemble their identity befitting the new environment. Importantly, a change in context for mathematical learning can present different opportunities to explore students' identity narratives (Andersson et al., 2015), something that will be teased out further in Chapter 3.

## **1.6 Theoretical and methodological framing**

The theoretical framing of this research is rooted in sociocultural theory, which positions learning and identity as inherently relational, negotiated and situated within social practices and contexts (Vygotsky, 1978; Wenger, 1998; Lerman, 2019). From this sociocultural perspective, mathematical learning is viewed not as an isolated cognitive event, but as an interactive, social process that unfolds through participation in communities of practice (Lave & Wenger, 1991; Wenger, 1998). Thus, mathematical identity is conceptualised as fluid and socially constructed, emerging through narrative practices and social recognition within classroom contexts (Sfard & Prusak, 2005; Bishop, 2012). The study further conceptualises the transition from primary to post-primary education as a dynamic process of becoming, informed by Nicholson's (1987) Transition Cycle. Nicholson's model frames the transition not as a singular event, but as an ongoing negotiation characterised by phases of preparation, encounter, adjustment and stabilisation. Such framing enables exploration of how students' mathematical identity evolve through their sustained engagement with changing educational practices, expectations and social interactions.

Methodologically, this study adopts a qualitative longitudinal design, following 17 students for 20 months, from the second half of Sixth Class to the beginning of Second Year of post-primary school. It employs a combination of Personal Journey Graphs (PJGs), semi-structured interviews, thematic analysis and the Listening Guide (Gilligan et al., 2003) to capture both the emotional nuances and narrative contours of students' identity journeys. In keeping with its theoretical stance, the study prioritises student voice and aims to document any changes that occur and the ways in which students themselves understand and articulate those changes over time.

## **1.7 Overview of the thesis structure**

The remainder of this thesis is organised into seven chapters. Each plays a specific role in building the argument and supporting the study's overall aim. The second chapter presents a review of the existing literature relating to the transition from primary to post-primary education, mathematics education and affective dimensions of learning, along with the emergence of mathematical identity as a conceptual lens. It highlights key patterns and tensions in continuity, engagement and student experience, setting the foundation for an identity-focused analysis of transition.

The next two chapters put forward the theoretical and methodological dimensions of the study. Chapter 3 outlines the theoretical foundations of the study drawing on sociocultural

theory, and explores the concept of mathematical identity. These frameworks inform the conceptual lens through which the transition is analysed. Chapter 4 details the methodological approach, including the longitudinal design, ethical considerations, participant recruitment and data collection methods. It explains how the Listening Guide and thematic analysis were used to explore student narratives.

Chapters 5 and 6 present the research findings. Chapter 5 is split into three distinct sections, portraying the in-depth narrative portraits of three students. Chapter 6 then follows with findings from the thematic analysis across the wider cohort of narratives. These two chapters explore how students' mathematical identity were negotiated throughout the transition. Flowing from the findings is an accompanying discussion in Chapter 7, where they are discussed in relation to the research questions, theoretical framework and wider literature. It highlights the emotional, relational and structural dimensions of transition and interrogates how these interact with students' evolving mathematical identity.

Finally, Chapter 8 concludes the thesis by synthesising the study's theoretical and practical contributions, identifying limitations and proposing directions for future research. It reflects on the significance of listening to students' voices during times of transition and reaffirms the importance of supporting students' mathematical identity across their education journey.

## Chapter 2: Literature Review

This chapter presents a review of existing research on the transition from primary to post-primary school, with particular attention to mathematics education in both international and Irish contexts. While much of the literature on this transition applies across multiple subjects, several studies focus specifically on mathematics, offering insights into factors that shape students' learning and their relationship with the subject.

The chapter begins by defining transition as it is understood in this study and outlining its significance for students. Section 2.2 explores key influences on students' experiences, grouped into three categories: school environment, personal factors and relational and social aspects. These are considered in relation to their impact on mathematical learning, including academic attainment and affective dimensions such as engagement and confidence. Differences in classroom learning experiences across the transition are also examined, including changes in time allocations, pedagogical practice and assessment. Given the study's focus on students' mathematical identity, a significant portion of this chapter is dedicated to exploring this concept. Section 2.3 begins by exploring the broader literature on identity in education before narrowing in on mathematical identity. The section traces its emergence in the research, highlights its relevance in mathematics education and outlines how it is conceptualised and studied. This provides a foundation for Chapter 3, where mathematical identity is positioned as the central conceptual lens for the study.

### 2.1 The primary to post-primary transition

#### *2.1.1 Establishing a definition and timespan*

The Oxford English Dictionary defines transition as “the process or a period of changing from one state or condition to another” (2020), implying it as both a course of action and, to a lesser extent, an event. While transition in education is conceptualised differently in different countries, within the literature, it typically refers to the “process of moving from one education setting to another” (Irish National Teachers Organisation [INTO], 2009, p. 6), a shift experienced by all students multiple times throughout their educational journey. In some literature, transition can also refer to movements between classes or grades (e.g. Rice, 1997), with the term transfer describing a shift across sectors (e.g. Galton et al., 2003).

Within studies of the primary to post-primary transition, researchers caution against framing it as a single event. Marshall and Hargreaves (2007, p. 79) describe it as a process that “may take far longer” than the moment of transfer itself. This idea is echoed in recent work by

Jindal-Snape et al. (2023, p.4), who emphasise that the transition centres around adjustments for students and conceptualise it as “an ongoing process of adaptation to any change”. For the purposes of this research, the transition is understood as both the physical move between schools and the accompanying adjustment to the new educational setting.

Framing transition as a process raises the question of its duration. Hargreaves, Earl and Ryan (1996) suggest that it spans from the final year of primary school into the latter part of First Year in post-primary school. Others also emphasise the extended time some students require to adjust (Kennedy & Cox, 2008), with Smyth et al. (2004) reporting that some students do not fully settle into their new environment until the end of First Year. The notion of students enjoying a “honeymoon” period in the opening half of their first year at post-primary is also evident in the literature (Kennedy & Cox, 2008). This period is short-lived as the realities of the new environment become apparent to students. It is also evident that as students settle into the new environment in post-primary school, academic demands such as assessment and homework eclipse more social or procedural concerns (Tilleczek, 2007).

### *2.1.2 Factors influencing the transition from primary to post-primary*

Many studies identify factors which can influence a student’s transition from primary to post-primary school. Research from many countries has brought together findings which highlight the opportunities and challenges faced by students during the transition process.

2.1.2.1 Curriculum continuity. As students move into post-primary education, they encounter a range of changes. Among these, curriculum continuity, particularly in mathematics, has been consistently identified as a critical influence on transition experiences. In Ireland, the importance of curriculum alignment was highlighted in a national review of post-primary mathematics (NCCA, 2005), in which it was argued that strengthening continuity would enhance student learning experiences. Similarly, in their systematic review of literature pertaining to mathematics and science across the transition, Kaur et al. (2022) emphasise that curriculum and pedagogical inconsistencies across both sectors can undermine student engagement and learning. They argue that greater alignment across curriculum in both sectors, supported by teacher collaboration and shared professional learning, can support students’ transition in mathematics. Indeed, students who identified links between work completed in their final year of primary school and their first year of post-primary school experienced a smoother transition (Evangelou et al., 2008).

From the student perspective, lack of continuity can undermine confidence and familiarity. In a large-scale Irish study, Smyth and her colleagues (2004) found that many

students perceived little connection between their primary and post-primary mathematics experiences. Mathematics was more often seen as harder than English or Irish following the transition. However, a balance is needed between foundational continuity and novelty. Curriculum repetition that does not build on students' prior knowledge can lead to difficulties such as disengagement (Ryan et al., 2024). Galton et al. (2003) reported that students sometimes found post-primary mathematics unchallenging or too similar to their previous work. Bridging units, while designed to ease transition, were not always well received. In one example, students reportedly cheered upon receiving new post-primary workbooks after completing bridging materials (Galton et al., 2003). While the study reflects a somewhat narrow view of curriculum, it found that discontinuity is not always problematic.

Irish teachers echo these concerns. In surveying their perspectives on the perceived barriers to a successful transition in the area of mathematics, curriculum continuity was highlighted as the top concern amongst respondents (Prendergast et al., 2019). The responses noted recent changes to the mathematics curriculum at post-primary level, while the primary curriculum had been in place since 1999. Teachers at post-primary level highlighted a perceived gap between the learning in both sectors. In their recommendations the authors call for much greater collaboration between teachers, noting that primary teachers need greater familiarisation as to what students will learn in post-primary school and, equally so, post-primary teachers need to place more emphasis on building on skills and knowledge students have garnered from primary school. A similar cross-border study of teachers in the Republic of Ireland and Northern Ireland examined the level of curricular knowledge held by teachers in each sector (O'Meara, Prendergast et al., 2020). Worryingly, the majority of primary teachers claimed to be either "somewhat" or "highly unfamiliar" with the contents of the mathematics curriculum at post-primary level. Although to a slightly lesser extent, post-primary teachers showed similar trends, with less than half of all those surveyed claiming to be "somewhat" or "highly" familiar with the mathematics curriculum at primary level.

**2.1.2.2 Pedagogical continuity.** Pedagogically, the transition to post-primary school generally involves students moving from one class teacher to a structure where they have multiple subject teachers. In recognising the wide-ranging notion of pedagogy, I want to note that while some of the studies cited in this section focus on particular aspects of pedagogy that are relevant to the transition, they rarely take account of the entire scope of the notion. Pedagogy is context bound and therefore difficult to compare in different settings.

In a longitudinal study involving students in their first year of post-primary school, it was found that in a typical school in England, students had more than 20 teachers (Symonds, 2009), highlighting the scale of pedagogical change. When examining students' experiences of transition in Australia, it was found that pedagogical continuity was a key factor which determined the success of the transition (Attard, 2010). The author surmised that teachers at post-primary level must not only consider the curriculum at primary level, but also the pedagogical approaches undertaken. In a recent comparative study examining the use of physical manipulatives in mathematical learning across the transition process (O'Meara, Johnson et al., 2020), results, sourced from questionnaire data from both primary and post-primary teachers, demonstrate that the majority of Irish students experience a significant discontinuity in terms of the use of manipulatives, something mirrored in Attard's study (2010).

Irish research on teachers' perceptions of mathematical pedagogical knowledge recorded that a small minority of primary teachers (14%) and post-primary teachers (16%) stated they were either "highly" or "somewhat" familiar with teaching methodologies used in the other sector (O'Meara, Prendergast et al., 2020). While acknowledging that teaching methodologies employed by each sector are by no means universal in that sector, the findings suggest a significant lack of cross-sector awareness. Interestingly, teachers in Northern Ireland reported greater familiarity with cross-sector methodologies than teachers in the Republic of Ireland. The authors suggested that training programmes available in Northern Ireland to support teachers in 2015 and 2016 have better equipped teachers for the transition process, offering professional learning to deepen knowledge in cross-sectoral curriculum and pedagogical matters. More recently, research involving primary teachers revealed that they adapted their pedagogical approaches to help prepare students for the move to post-primary school (Martinez-Sainz et al., 2025). The researchers found that teachers reported using "increased testing, homework, and more standardised learning approaches" (Martinez-Sainz et al., 2025, p.28), raising questions about the expectations these teachers had for what happens in post-primary school.

Given this knowledge gap, students are often exposed to the "fresh start" approach (Hargreaves & Galton, 2002), in which teachers at post-primary level disregard the vast majority of what students learned previously and begin teaching a concept or unit of learning from scratch. It typically involves a rapid revision of work previously completed, which can cause issues for some students. High-achieving students can find such exercises repetitive, while those who struggle with mathematical learning can find the pace too fast (Hargreaves & Galton, 2002).

Bicknell and Hunter (2012) also found that such repetition may lead to confusion and disengagement.

In the Irish context, this issue appears widespread. O'Meara, Prendergast et al. (2020) found that over two-thirds of post-primary mathematics teachers in the Republic of Ireland reported using a "fresh start" approach, compared to just one-quarter of their Northern Irish counterparts. These practices suggest a certain mistrust between sectors (Galton et al., 2000), with student data supplied by primary schools seemingly under-utilised and disregarded. This aligns with what Bicknell and Hunter (2012, p.13) labelled "unspoken assumptions" held by incoming teachers as to the "validity and reliability of the primary sector assessment data".

**2.1.2.3 Individual factors.** In addition to school-based factors, individual characteristics also shape students' experience of the transition. These include gender, special educational needs (SEN), adolescence-related changes and family background.

Gender differences in the area are well documented. Studies have found that girls often face more challenges across the transition than boys, including greater loneliness and anxiety, despite frequently outperforming boys academically (Smyth, 2017; Benner & Graham, 2009). Benner and Graham (2009) also observed that girls' academic achievement tended to decline more sharply following the move to post-primary school. As girls typically experience puberty earlier than their male counterparts, this can increase sensitivity to social comparison and emotional vulnerability (Martel, 2013). Symonds and Galton (2014) suggest that these dynamics may contribute to the lower self-esteem reported by girls during the transition. On the other hand, some studies highlight emotional vulnerability among boys, particularly where emotional distress goes unnoticed. In a study of 252 American students, Benner et al. (2017) found that boys internalised stress more often during the transition. Furthermore, boys were more likely to disengage from learning, often distancing themselves from academic effort to gain peer approval (Symonds & Galton, 2014).

Students with SEN are shown to face greater challenges during the transition process (White, 2020; Smyth, 2016). In the Irish context, it was found that students with SEN were more likely to struggle with social integration, establishing friendships and managing anxiety (Foley et al., 2016). These students were also more vulnerable to bullying. Research also indicates that students with SEN find the transition to special schools at post-primary level easier than mainstream schools (Barnes-Holmes et al., 2013). Contributing factors included a more individualised curriculum, less pressure to integrate with non-SEN peers and stronger overall support. Parents in the study expressed concern about academic setbacks and reported

prioritising social inclusion over academic performance during the transition. Similarly, a separate study highlights parents' concerns about their children's ability to adapt socially and emotionally to post-primary school, particularly regarding confidence and belonging (Dupont et al., 2023). Many parents felt under-informed and unsure how to support their children, citing limited access to information about subject choices and available supports.

The transition to post-primary school occurs during a time of significant developmental change for students. For most students, this move coincides with early adolescence, a time of emotional, physical and cognitive change (O'Toole et al., 2014; Anderson et al., 2000). While these changes may intensify the challenges of transition, Benner and Graham (2009) note that it can be difficult to disentangle the effects of puberty from those of school transition. This caution is important in interpreting patterns of disengagement or stress during the transition.

In addition to these individual developmental factors, family background can also shape transition outcomes. Research points to links between socio-economic status and transition success. Students from lower socioeconomic backgrounds may lack access to the same level of parental support, placing them at a disadvantage (Anderson et al., 2000; Rice, 1997). Drawing on Irish data from the GUI study, Smyth (2016) found that students from households with greater "social and cultural capital" experienced smoother transitions (p. 462). The author notes that some social influences can be subtle in nature, including school choice or parental advice around subject choice. Students from migrant backgrounds may also face unique challenges, including less familiarity with the education system and fewer familial supports (Smyth, 2016). Frequent and open communication between parents and children has been found to ease the transition (Smyth, 2017), while less frequent communication has been associated with greater difficulties. Additionally, having an older sibling who has already navigated the transition can provide reassurance and practical guidance (Rice, 1997).

These individual-level factors, though varied, are often interconnected. Students' personal and emotional readiness can either buffer or amplify the challenges posed by structural transition factors (Jindal-Snape et al., 2023). Attending to these is critical to supporting all learners through this complex phase.

**2.1.2.4 Relationships and social factors.** The transition to post-primary school involves multiple stakeholders, including students, parents, teachers and school leaders. Research highlights the value of viewing all these groups as equal partners in supporting a successful transition (van Rens et al., 2018). Central to this is the quality of relationships students hold with

peers, teachers and family members. Disruptions to these relationships can significantly affect students' emotional wellbeing and adaptation (Benner et al., 2017).

Peer relationships are especially prominent during the transition period. The move brings with it much change in this area, disrupting friendship bonds and creating new ones. Findings from a large-scale British study across the transition show that this period of instability for friendships is a significant concern for many students (Rice et al., 2015). Similarly, Smyth (2017) identified anxiety in the lead-up to transition, particularly related to social adjustment. Several studies indicate that social concerns outweigh academic ones for many students. For instance, Howard and Johnson (2004) found that students ranked "making friends", "fitting in" and "avoiding bullying" as their top transition-related concerns. This finding echoes more recent research in the Irish context, where Martinez-Sainz et al. (2025) reported that "Losing old friends" was the top concern of Sixth Class students ahead of their move to post-primary school. Galton et al. (2003) argue that peer relationships offer both academic and emotional support, calling for schools to embed opportunities for structured peer interaction across the transition. However, while challenges are evident, the literature also reflects students' capacity for resilience. Weller (2007), drawing on a three-year study, concluded that most students ultimately adapt to new social contexts, forming new friendships and building confidence.

Relationships with teachers also play a critical role. The shift from one primary teacher to multiple subject-specific post-primary teachers can reduce the emotional support students receive after the move (Symonds & Galton, 2014). Yet, this support is pivotal. Positive relationships have been shown to ease school integration (Hanewald, 2013; Waters et al., 2014b). Symonds (2009) found that students' perceptions of their teachers and their experiences of learning shaped their overall school attitudes more strongly than developmental factors associated with adolescence. Irish research echoes these findings. In the GUI study, it was found that praise and positive feedback from teachers help to support a smoother transition for students, leading to improved engagement with learning (Smyth, 2016). Specifically in mathematics, students who experienced supportive relationships with their mathematics teachers demonstrated more positive attitudes and fewer difficulties (Smyth, 2017). This is reinforced by Attard (2010), who showed that in Australian classrooms, changing teacher-student dynamics across transition had a major effect on students' engagement with mathematics. Students described teacher encouragement and individual attention as more important than other pedagogical features in shaping their attitudes toward the subject.

The transition to post-primary school is therefore not only a structural or academic change, it is a deeply relational one. Students carry a mix of expectations, hopes and anxieties as they navigate new settings and social networks. A successful transition appears to depend on curriculum alignment, considered pedagogy and also on the quality of relational support offered by adults and peers. For students, resilience and the capacity to cope with change would appear an essential component. Given students' diverse needs, a one-size-fits-all approach appears unreasonable. The next section turns more specifically to mathematics, exploring how students' learning experiences and affective responses to the subject evolve across the transition.

## 2.2 Mathematical learning across the transition

While the factors described in the previous section influence students in a variety of ways, including wellbeing and emotional development, this section focuses further on students' mathematical learning. As discussed earlier, the transition to post-primary school coincides with key developmental changes during adolescence, rendering students especially vulnerable to shifts in their mathematical learning (Midgley et al., 1989).

The section begins with an exploration of mathematical learning experiences, followed by an overview of achievement patterns and relevant affective constructs. It should be noted that in much of the literature, mathematical learning during this time is not always the sole focus of studies. In such cases, references to broader learning patterns are included, where appropriate.

### 2.2.1 *Mathematical learning experiences*

Learning experiences are central to mathematics education. While a broad body of literature explores this area, the focus here is on findings relevant to the transition from primary to post-primary school. These studies emphasise the role of these experiences in shaping students' mathematical development and examine how they evolve during this period. Changes in the learning environment following the move to post-primary school can negatively impact students' affective responses and the level of value students attribute to mathematics. Students' classroom experiences have a direct impact on their attitudes toward the subject (Nardi & Steward, 2003). Boaler (2000) goes further, describing an inseparable link between mathematics learning experiences and the evolving identity of students as mathematics learners.

Taking account of factors outlined earlier in the chapter, challenges such as academic disengagement and the developmental changes associated with adolescence mean students at this time have "a complex set of social, emotional and learning needs" (Waters et al., 2014a,

p.154). The considerations that follow offer a snapshot of the most important elements that shape students' mathematical experiences during the transition.

**2.2.1.1 Collaborative learning.** A consistent finding in the literature is that students tend to experience a decline in opportunities for collaboration following the move to post-primary school. Symonds and Galton (2014) note that students report fewer chances to work with peers, move freely around the classroom or choose their learning partners and projects, at a time when their need for autonomy increases. Additionally, Attard (2010) found that students were more engaged with mathematics when classroom environments supported choice and collaboration. Data in the Irish context from the National Assessments of Mathematics and English Reading (NAMER) (Kavanagh et al., 2015) reveals that over one-third of sixth-class students participated in group work in most mathematics lessons. However, whole-class teaching still dominated (used in 85% of lessons), followed by individual work (71%). This suggests that while collaborative practices featured, they often existed alongside more teacher-led formats.

Attard (2012) laments that the mathematics classroom can often be individualistic in nature compared with other subjects, with learning activities being predominantly solitary. Such a representation of the mathematics classroom, along with a focus on memorisation and reproduction of procedures brought Boaler (2000) to label them as "other-worldly" and "strange" places for students. The author goes on to warn that if students cannot forge connections with their own lives and indeed with other subject areas, the mathematical knowledge they have will become compartmentalised in their minds, as students "may simply condemn their mathematical knowledge to nether reaches of their minds, producing learning identities that lack compatibility with any other places" (Boaler, 2000, p.394).

**2.2.1.2 Streaming.** Another influential factor across the transition is the use of ability-based grouping strategies. At primary level, data from NAMER (Kavanagh et al., 2015) reveals that in sixth classes, ability grouping was used in 21% of all mathematics lessons, compared to 16% of English lessons. Indeed, ability grouping is especially prevalent in core subjects, with mathematics showing the highest levels of use (Smyth et al., 2004). The use of ability grouping appears to intensify at post-primary level, with the transition often associated with widespread ability streaming (Connolly et al., 2019). The practice of streaming entire classes according to attainment in mathematics appears particularly prevalent, with the OECD (2013) reporting that over 95% of 15-year-old Irish students are grouped by ability, placing Ireland amongst the

highest of all participating countries. These practices are likely linked to preparation for Junior Cycle exam levels<sup>1</sup>, which schools often used to justify such grouping.

However, concerns have been raised about the equity of these practices. Dooley (2019) cautions against the use of such strategies at primary level, as they are likely to stifle learning opportunities for some students. Reflecting on the use of ability groupings in post-primary schools in England, researchers criticise the poor information used for grouping (Connolly et al., 2019) and the fixed view of mathematics learning it conveys (Francis et al., 2017). Similarly, Solomon and Black (2008) argue that perceptions of mathematical ability are often based on “speed and a perception that you can either do it or you can’t.” The effects of early ability grouping can be far-reaching, shaping attitudes toward learning (Boone & Demanet, 2020) and reinforcing broader inequalities tied to gender and ethnicity (Connolly et al., 2019). The impact of such practices during a time of significant educational and emotional transition cannot be understated. Boone and Demanet (2020) found that early ability grouping can shape students’ long-term outlooks on learning and reinforce systemic inequalities. One could hypothesise that the CIC may have temporarily delayed the onset of ability streaming until Second Year in some schools. However, with the CIC now discontinued, its influence has likely diminished. What remains clear is that, by Third Year, the vast majority of students in Ireland are streamed for mathematics, raising questions about equity and student identity development during this critical period.

**2.2.1.3 Time.** Time is a critical factor in shaping students’ learning (O’Meara & Prendergast, 2017). The amount of instructional time allocated to mathematics directly impacts students’ opportunities to explore, develop and refine mathematical thinking, making it an important lens through which to examine the transition period.

At primary level, data from recent NAMER assessments show that average weekly mathematics instruction in Sixth Class increased from 258 minutes in 2009 to 283 minutes in 2014, and to 299 minutes in 2021 (Eivers et al., 2010; Kavanagh et al., 2015; Kiniry et al., 2025). This rise aligns with findings from TIMSS, which reported a 10% increase in Fourth Class mathematics instruction time between 2011 and 2015 (Clerkin et al., 2017). This rise likely stemmed from the national literacy and numeracy strategy (DES, 2011a), which raised the recommended mathematics weekly allocation from 180 to 250 minutes (DES, 2011b). NAMER

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<sup>1</sup> In the Irish education system, the Junior Cycle refers to the first three years of post-primary schooling, typically culminating in state examinations. These exams are offered at two levels in mathematics; *Higher Level* and *Ordinary Level*.

data suggest many schools exceed these guidelines, with the latest report confirming further increases (Kiniry et al., 2025).

In contrast, time allocations at post-primary level present a different picture. While the DE provides no strict guidance, the Junior Cycle mathematics curriculum recommends 240 teaching hours across three years, equating to approximately 80 hours per year or 144 minutes per week. OECD data indicates that, in practice, students in Ireland receive around 111 hours of mathematics per year (154 minutes per week) during their first three years of post-primary education (OECD, 2014). TIMSS findings report similar figures, with 109 hours per year (151 minutes per week) in Second Year (Clerkin et al., 2018). A national study by O’Meara and Prendergast (2017), involving 229 post-primary schools, offers more detail. It shows that first-year students received an average of 191 minutes per week, increasing slightly to 194 minutes in Second Year. Despite the variation across these sources, generally, students often experience a notable dip in mathematics instructional time in mathematics after moving to post-primary school.

**2.2.1.4 Learning manipulatives.** Manipulatives, both physical and virtual, can “allow users to model both real world and abstract structures in mathematics education in a more tactile manner” (O’Meara, Johnson et al., 2020, p. 837). According to the 2014 NAMER study (Kavanagh et al., 2015), real-life materials and manipulatives were widely used in Sixth Class, with 52% (for real-life materials) and 27% (for manipulatives) of students in classes where they were used at least once or twice a week. However, research indicates that such practices decline following the move to post-primary school, where learning becomes more transmission-oriented and focused on written tasks (Gueudet et al., 2016). This shift occurs at a time when many students may still be situated in Piaget’s concrete operational stage of development, suggesting that manipulatives continue to retain value (O’Meara, Johnson et al., 2020).

Attard (2010), in a longitudinal study of 55 students across the transition, highlight stark differences in learning experiences. Student interviews revealed a chasm between hands-on and practical learning experiences in primary school with independent, computer-based experiences in post-primary school. The author noted that this sudden change happened at a crucial time when students were moving “from a concrete-manipulative state to abstract thought”, and this pedagogical shift resulted in reduced levels of student engagement with mathematical learning (Attard, 2010, p. 59). While the study was limited by its single-school sample that could have had an undue bearing on the study’s results, it nevertheless underscores the impact of sudden pedagogical change during the transition.

In the Irish context, similar findings emerged in a study conducted by O'Meara, Johnson and colleagues (2020), where a noticeable drop-off in the use of physical manipulatives in post-primary school was reported. The study also highlighted barriers to their use, including teacher beliefs, time constraints and classroom management. Paul (2014) echoes these challenges, particularly at post-primary level, where timetabling can limit opportunities for practical, hands-on activities. Nonetheless, he argues that such barriers can be overcome and that using manipulatives offer substantial benefits during this critical transition period.

**2.2.1.5 Assessment.** Assessment models strongly influence pedagogy and the nature of students' learning experiences in mathematics classrooms (Boaler, 2000). Following the transition to post-primary school, students often encounter an intensified assessment culture, with more frequent testing and academic pressure. In Australia, it was found that students became increasingly concerned with the number and pressure of mathematics assessments during their first year of post-primary (Attard, 2010). Similarly, a Norwegian study revealed students' experiences of a new assessment culture following their move to post-primary school, with increased frequency of tests and heightened academic focus (Strand, 2019). In the Irish context, NAMER data (Kavanagh et al., 2015) shows that, in Sixth Class, commonly used assessment strategies included teacher-designed tests (44%), error analysis (42%) and student self-assessment (41%). In contrast, reflective journals and computer-based testing were rarely used, with 83% and 70% of students respectively in classes where these methods were never employed. While the study did not provide a definition of such strategies, they suggest that the primary mathematics classroom still draws heavily on more traditional forms of assessment. In comparison, post-primary mathematics learning, involves increased reliance on summative forms of assessment. TIMSS data (Clerkin et al., 2018) revealed that 87% of Irish Second Year students were in classes where tests were used to monitor progress, a figure above the international average of 75%. Conversely, just 58% reported experiencing ongoing or formative assessment, compared to the international average of 72%.

At the primary level, the growing prominence of standardised testing also impacts the learning environment. Since 2007, such tests have become more embedded, with mathematics testing mandated in Second, Fourth and Sixth Classes, and results shared with both the DE and parents (O'Leary et al., 2019). O'Leary and colleagues raise concerns about narrowing of the curriculum and the overemphasis on test preparation, potentially limiting broader, more exploratory learning experiences. Recent insights from the latest NAMER report, highlight the different uses of standardised tests results in schools. Principals, for example, reported finding them very useful in identifying students with learning difficulties (59%), setting school-level

targets (42%) and informing classroom teaching (40%) (Kiniry et al., 2025). Meanwhile, at post-primary level, recent assessment reforms, such as the introduction of Classroom-Based Assessments (CBAs) in mathematics (NCCA, 2020), seek to broaden the range of evaluative experiences. These CBAs, which involve students undertaking either a problem-solving or statistical investigation task, account for 10% of the overall Junior Cycle mathematics grade. It remains to be seen whether these initiatives will meaningfully shift practice in ways that better support student learning.

**2.2.1.6 Talk and discussion.** While pedagogical continuity was discussed earlier in this chapter, one particularly illustrative example, the role of talk and discussion, helps to expose the marked differences in students' experiences across the transition. Talk and discussion are widely recognised as central to effective mathematical learning (Dooley et al., 2014; Sfard, 2007).

With recent changes to the primary mathematics curriculum, both the old and new curriculum emphasise talk and discussion. Underpinned by a constructivist philosophy, the Primary School Mathematics Curriculum (DES, 1999) promoted talk and discussion between peers and between child and teacher as central to developing, clarifying and evaluating mathematical ideas. It was also central to language acquisition and conceptual development, with talk "an integral part of the work in each strand" (DES, 1999, p. 15). The new Primary Mathematics Curriculum (DE, 2023a), which adopts a more socio-cultural framing, identifies "Maths Talk" as one of five key pedagogical approaches considered essential for developing mathematical proficiency amongst students. The Junior Cycle mathematics specification also highlights the communication, particularly within the unifying strand. Students are expected to "communicate mathematics effectively: justify their reasoning, interpret their results, explain their conclusions and use the language and notation of mathematics to express mathematical ideas precisely" (DES, 2018a, p. 10). The verb 'discuss' appears in three additional learning outcomes, defined as offering "a considered, balanced review that includes a range of arguments, factors or hypotheses; opinions or conclusions should be presented clearly and supported by appropriate evidence" (DES, 2018a, p. 25). While this is not a direct curriculum comparison, it is still worth noting how the pedagogical approach is viewed in each curriculum.

National and international assessments data also offer some insight into the prevalence of talk and discussion in classrooms, though interpretation is limited by the lack of detailed definitions provided to participants. Data from NAMER (2015) indicate that 90% of Sixth Class students are in classrooms where peer discussion is encouraged in at least half of all mathematics lessons (Clerkin et al., 2017). In contrast, for students in Second Year, this drops to

55% (Clerkin et al., 2018), amounting to a significant decline. Moreover, Irish students experience a greater drop than their international peers, as the upper primary figure was higher than corresponding rates in other jurisdictions.

In summary, this section has outlined how the transition introduces significant shifts in students' mathematical learning experiences. Changes in pedagogy, assessment, grouping, time allocation and use of manipulatives create a different learning environment for students. These shifts, alongside broader contextual factors such as class size and available resources, raise important questions about how students engage with and indeed view mathematics during this time.

### *2.2.2 Mathematical achievement*

The transition from primary to post-primary education is a critical period that has been associated with changes in students' mathematical achievement. In a review of 96 studies on the primary to post-primary transition conducted for the Scottish government (Jindal-Snape et al., 2020), it was summarised that there was a noted decline in students' educational outcomes as they moved to post-primary education.

In the late 1970's, in one of the first major studies examining the transition, the Observational and Classroom Learning Evaluation study in England revealed that close to half of all students did not make any progress on standardised tests in the areas of English, Mathematics and reading comprehension at the end of their first year of post-primary school (Galton & Willcocks, 1983). Two decades later, the study was replicated by Hargreaves and Galton (2002) and involved 300 students. The study showed that around 40% of all students failed to make any progress during the first year in post-primary school. In contrast, a longitudinal study in New Zealand which followed children from the age of five years old, found no evidence to suggest that the transition to post-primary had a negative impact on students' achievement in mathematics, with the authors citing performance and engagement at a younger age to be more influential on their achievement (Wylie et al., 2006).

In terms of recorded data on student mathematical performance in the Irish context, Smyth et al. (2004) administered standardised mathematics tests to students at the beginning and end of First Year in post-primary school. The majority of student results remained static in both reading and Mathematics. Where students did improve on their results, they were twice as likely to improve in reading than in Mathematics. The authors suggest that progress in these areas may be limited as a result of the greater range of subjects that students are working on and also the different teaching methodologies students need to become accustomed to. More

recently, Ryan (2018) found a decline in the mathematical academic performance of students following their first year in post-primary school. Notwithstanding this study's reliance on standardised testing, usually associated with the primary curriculum, as the sole measure of student mathematical knowledge and understanding, the decline in student performance should be noted and supports findings from other jurisdictions. In the accompanying recommendations, the author calls for evidence-based research into the causes and remedies for such declines (Ryan, 2018).

In their study of students moving to intermediate school in New Zealand, Bicknell and Hunter (2012) suggest that initial declines in achievement levels could be accounted for by the early nature of the assessments, the natural learning loss over the summer holidays, as well as the emotional factors as a result of the transition itself. Meanwhile, Rice (2001) puts forward a far simpler reason, that of disruption. Given the significance of the transition in the lives of students, this major disruption can distract from learning and undermine progress. However, Jindal-Snape et al. (2020) caution against labelling a specific reason for such achievement dips, noting that the cause and effect are not obvious, with a lack of robust longitudinal studies evident in the area. As noted in the introductory chapter, this call for further longitudinal research is particularly noted, especially given the conceptualisation of the transition as a process that takes place over a period of time.

### *2.2.3 Affective domain in mathematics*

The affective domain, encompassing attitudes, motivation, engagement and, to a lesser extent, self-efficacy, identity and anxiety, is frequently referenced in literature on the transition from primary to post-primary school. While some studies focus on individual affective components, overlap is common, with researchers often examining multiple elements simultaneously.

**2.2.3.1 Attitudes.** Attitude is understood as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly & Chaiken, 1998, p. 269). Within mathematics education, a positive attitude reflects a favourable disposition towards the subject, whereas a negative attitude conveys emotional disengagement or resistance (Zan & Martino, 2007). Studies focusing on the transition, as well as international assessments in the area of mathematics both measure and highlight the attitudinal disposition of students.

In their study of academic and social factors shaping students' move to post-primary school, Smyth et al. (2004) found that students often described post-primary mathematics as the

same or “harder” than primary-level mathematics. This perception was more common for Mathematics than for English or Irish. The study, which involved surveying students in September and May in First Year, also showed that in terms of a most preferred subject, the number of students who chose Mathematics dropped marginally during this time. The same study recorded a dip in student attitudes toward school and learning, more generally, over that period. A similar trend was noted in Galton et al.’s (2003) longitudinal study in England, which measured student attitudes at three points; just before the end of primary school (July), early in the post-primary year (November) and again at the end of First Year (July). Student attitudes toward mathematics declined sharply between July and November, with a further, smaller decline by the final data collection. In contrast, attitudes towards English improved over that time frame. Interestingly, improvements in mathematical attainment were not consistently linked to improvements in attitudes, whereas a positive correlation between achievement and attitude was observed for English.

More recently, Deieso and Fraser (2019) found that Australian students in their first year of post-primary education held more negative attitudes towards mathematics compared to their final year in primary school. The study noted a decline in enjoyment, increased anxiety and a reduced appreciation for mathematical inquiry. The authors emphasised the transition period as critical for shaping students’ mathematical attitudes, though they acknowledged limitations such as the lack of a qualitative component and the use of a cross-sectional, rather than longitudinal, design. In the Irish context, using a nationally representative sample of students, Ryan (2018) used a questionnaire to measure student attitudes towards mathematics at the end of First Year in post-primary school. Although no comparable data was gathered in the previous year, the study did record high levels of mathematical anxiety amongst students, with those with lower standard ten (STen) scores more likely to exhibit worries towards mathematics homework or assessments.

**2.2.3.2 Engagement.** Engagement is conceptualised in varied ways across the literature. Libby (2004, p. 278), for instance, defines academic engagement as the “extent to which students are motivated to learn and do well in school.” Meanwhile, Audas and Willms (2001) describe it in terms of students’ participation in both academic and non-academic activities, as well as how they value the overall purpose of schooling. Given this diversity of definitions, engagement is best understood as a multifaceted construct, encompassing several core dimensions, including behavioural, emotional and cognitive (Appleton et al., 2008). As discussed earlier in this chapter, these dimensions are especially significant during the transition period, when students must adapt to new learning environments, and expectations.

Indeed, engagement is deemed in the literature to hold notable relevance during the transition from primary to post-primary education. A survey-based study of 541 Australian students found that those in their first year of post-primary school were less engaged in their classroom environment than a cohort of students who were one year younger (Deieso & Fraser, 2019). As discussed earlier in this chapter, the move to post-primary school matters deeply to students and is accompanied by expectations to be treated as more mature and independent learners. Meeting these expectations is linked to enhanced engagement (Galton et al., 2003); where they are unmet, students may experience disappointment that can lead to disengagement. More specific to mathematics, Bicknell and Hunter (2012) point to the lack of pedagogical continuity, in particular the “fresh start” approach, as a cause of disengagement amongst students in mathematical learning.

In observing a fall in engagement levels amongst students after the move to post-primary school, Hargreaves and Galton (2002) provided data relevant to Mathematics, Science and English. For Mathematics, the percentage of students who were fully engaged dropped from 61% to 50%, a sharper fall than in English but less severe than in Science. In the Irish context, data from the GUI study show high levels of student engagement at primary level (McCoy et al., 2012). Acknowledging the multidimensional nature of engagement, the GUI framework considers factors such as liking school, liking school subjects, academic self-concept and school attendance (Smyth, 2017). The study reveals students in Second Year of post-primary school were more likely to be disengaged from school than those in First Year (Smyth, 2017). This raises important questions around what is happening during this period and whether the transition process plays a role in this downturn.

In mathematics specifically, student survey data from TIMSS 2015 (Perkins et al., 2020) show that Irish Fourth Class students (aged 9–10) report high levels of engagement, with both boys and girls scoring above the international average. Amongst second-year post-primary students, however, these engagement levels drop significantly, falling below the international average for both genders. Notably, while girls in Fourth Class showed higher engagement than boys, this trend reverses by Second Year, with girls slightly less engaged than their male peers.

**2.2.3.3 Self-efficacy and self-concept.** Both self-efficacy and self-concept are key constructs within the broader family of self-beliefs and hold relevance across the transition to post-primary school. Self-efficacy refers to students’ beliefs in their capability to perform and complete a learning task (Bandura, 1986), influencing both learning outcomes and levels of engagement (Bandura, 1997). These beliefs primarily arise from students’ cognitive judgments

about their own competence (Bong & Clark, 1999). When students perceive a task as too difficult, they may avoid it altogether, whereas belief in their ability tends to lead to persistence and goal attainment.

In contrast, self-concept within education refers to students' perceived competence in a particular subject, which can influence their motivation and engagement with learning. It is shaped by prior learning experiences and how students interpret their ability to succeed in academic tasks (Mullis & Martin, 2013). While the two constructs share similarities, Bong and Clark (1999) distinguish self-concept as incorporating both affective and cognitive components, and being more strongly influenced by social comparison.

While not specific to mathematics, a student's experience of the transition to post-primary level has been shown to affect one's self-efficacy, with students who experienced difficulties becoming less confident in their own abilities (Smyth, 2017). Eccles et al. (1993) argue that the heightened emphasis on academic performance and competition in post-primary school can negatively influence self-efficacy at a time when students are already navigating complex social and emotional changes. The same authors, as well as more recent studies (e.g., Connolly et al., 2019), highlight the use of certain practices such as ability grouping and comparative assessments as potentially harmful during this time.

Changes in classroom practices can also shape students' self-efficacy. For example, Akos et al. (2007) highlight that increased emphasis on performance-driven pedagogy during the transition to middle school in the United States can reduce students' confidence in mathematics. Their research points to a particularly sharp decline in mathematical self-efficacy among girls, who may become more focused on social and relational issues. The authors express concern that diminished self-efficacy at this stage can have long-term effects on students' relationship with the subject. Similarly, data from a recent Irish study indicates that at the end of First Year, girls have noticeably lower levels of self-efficacy towards mathematics than their male counterparts (Ryan, 2018).

Like self-efficacy, self-concept is also sensitive to the transitional experience. A literature review examining psychological developments across the transition identified multiple factors influencing academic self-concept during this time (Symonds & Galton, 2014). In particular, they emphasised the need to strike a balance between providing appropriately challenging learning experiences and avoiding cognitive overload, which can undermine students' self-belief. Additional factors including students' experiences of autonomy, enjoyment in learning and identity development are all proposed as being significant.

Data from the GUI study also shed light on changes in academic self-concept. While focusing on general rather than subject-specific perceptions, Smyth (2017) reported that boys aged 13 were more likely to view themselves as competent learners than their female peers. Notably, students who struggled with particular subjects, especially Mathematics, were more likely to experience a decline in self-concept. Though a general decline was observed across all students during the transition, it was more pronounced among girls. This aligns with TIMSS findings (Perkins et al., 2020), which similarly reported a steeper attitudinal drop among girls compared to boys.

**2.2.3.4 Motivation.** Motivation is widely recognised as a core component of academic achievement (Mullis & Martin, 2013). Discussing student motivation at lower post-primary level, Pell (2009) distinguishes between intrinsic motivation, where students are driven by interest and enjoyment in the learning itself, and extrinsic motivation, where behaviour is influenced by external demands or rewards. Intrinsic motivation, described by Deci and Ryan (1985, p. 32) as an “energizer of behavior,” is generally regarded as more conducive to deep learning than extrinsic motivation (Becker et al., 2010). Additional classifications of motivation, such as mastery motivation, achievement motivation and fear of failure, are also identified in the literature. Pell (2009) further suggests that a student’s perception of their own ability can significantly influence their motivation to learn.

Bicknell and Hunter (2012) pinpointed a lack of learning continuity, the increase in time pressures and pace of learning and the level of challenge, whether too difficult or too easy, as having a negative impact on students’ motivation towards mathematics. Specific to the primary to post-primary school transition, Hargreaves and Galton (2002) noted an increase in motivation immediately after the point of transition, but this later resided over the course of the first full year in post-primary school. This could indicate that as students become accustomed to their new surroundings and raises the need to examine such affective domains over the course of an extended period. More recently, a longitudinal study in Austria, involving 600 students, reported a gradual decline in intrinsic motivation of students between the ages of 11 and 16, with the most marked drop occurring between ages 13 and 14 (Gnambs & Hanfstingl, 2016). Of note, the study also emphasised that when students’ basic psychological needs for “autonomy”, “competence” and “relatedness” were supported, these declines in motivation could be meaningfully offset.

**2.2.3.5 Mathematics anxiety.** Characterised as someone’s “negative affective reaction to situations involving numbers, math and mathematics education” (Ashcraft & Moore, 2009,

p.197), mathematical anxiety has a significant impact on learning and is estimated to affect 20% of the population (Maloney et al., 2014). Students who experience anxiety towards mathematics are more likely to struggle with the subject compared to those who associate it with positive emotions (OECD, 2013a).

Evidence suggests that mathematics anxiety can shift across the transition to post-primary school. In a cross-sectional study comparing two student groups, Deieso and Fraser (2019) found higher levels of mathematics anxiety among first-year post-primary students than among their final-year primary counterparts. Notably, this study found no significant gender differences. However, Devine et al. (2012), in a UK-based study involving over 450 students aged 11 to 16, identified significantly higher levels of mathematics anxiety in girls than in boys, with a clear link between elevated anxiety and lower performance. This was also evidenced in the Irish context, where Ryan (2018) reported that girls in First Year of post-primary school were more likely to experience mathematics anxiety than boys. In the same study, roughly one fifth of all students surveyed felt anxious when doing mathematics homework, while nearly half reported anxiety when encountering difficulties in the classroom. Notably, this latter figure was 17% higher among girls. These findings echo the 2012 PISA study (Perkins & Shiel, 2016), which found that mathematics anxiety among Irish students was significantly higher than the OECD average.

Interestingly, in their systematic review of transition literature in the area of mathematics and science, Kaur et al. (2022) situate mathematics anxiety as the “most researched construct that influences identity formation during primary-secondary transition” (p.10). Reflecting the growing perceived significance of mathematics anxiety in post-primary school, there have been calls for more research, particularly in the primary sector, to explore the roots of mathematics anxiety (Devine et al., 2012).

2.2.3.6 Summary. The dimensions of the affective domain and their relationship with mathematics hold considerable relevance across the transition. As presented above, these dimensions often relate to each other and go on to be influenced by or influence another. Notably, across these dimensions, the transition appears to coincide with a general decline in students’ affective responses to mathematics. Factors such as reduced pedagogical continuity and the onset of adolescence seem to contribute to this pattern, with both structural and developmental influences at play. Additionally, gender disparity in areas such as attitudes, self-concept and mathematical anxiety seems prominent and raise very important questions about how different students experience the transition.

These insights show that students' relationships with mathematics are shaped by a multitude of factors. Emotions such as anxiety, motivation and confidence are intertwined with how students experience mathematics and see themselves as mathematics learners. Understanding this evolving relationship requires an approach that takes account of both the individual and the wider context. To investigate this more fully, the next section introduces the concept of mathematical identity as a way to explore how students make sense of their experiences in mathematics and how they come to understand themselves as mathematics learners during this period of change.

## 2.3 Mathematical identity

While there is a significant body of research that has examined affective dimensions such as attitudes, motivation and anxiety in students' experiences of mathematics, mathematical identity has only more recently gained traction as a central construct in the field. This latest rise has been labelled as a "coming of age" for this area of research (Graven & Heyd-Metzuyanim, 2019).

This section begins by outlining the broader concept of identity and its relevance within educational research, with particular attention to the notion of learner identity. The focus is then narrowed to the development of mathematical identity, tracing how the concept has emerged and evolved within mathematics education literature. Following this, there is an examination of key constructs and influencing factors associated with mathematical identity, before exploring the different ways in which it has been operationalised and measured in existing studies. While Chapter 3 sets out the specific theoretical framework and definition of mathematical identity used in this study, the present section serves to contextualise that framework by reviewing the broader empirical landscape.

### 2.3.1 *Identity: background*

Historically, the concept of identity has deep roots across multiple disciplines, from philosophy (Mead, 1913) to psychology (Erikson, 1968) and anthropology (Holland et al., 1998). Two of the most influential early thinkers in this space are George Herbert Mead and Erik Erikson. Erikson, writing from a psychological perspective, framed identity as something acquired (1968) and is widely known for coining terms such as "identity crisis" and "mid-life crisis" (Gleason, 1983). In contrast, approaching identity from a philosophical and sociological perspective, Mead conceptualised identity as an action, something "one does" (Mead, 1913). He emphasised the social construction of identity, highlighting how changes in identity often involve internal conflicts between different new voices, with each other and with the "dominant part of

the old self" (Mead, 1913, p. 378). This view also connects with later work by Vygotsky (1978), particularly around internalisation and dialogic selves, which support the understanding of how individuals are able to organise their thoughts and emotions in the name of an identity.

Tracing identity within the area of social sciences and humanities, Gleason (1983) points to the 1950s as the decade which saw identity emerge as a substantive concept in research. Initially framed in psychological and social terms, identity soon became a key site for exploring the relationship between the individual and society. From there, identity carried important psychological and social significations, with research in the area foregrounding questions linked to the relationship between individuals and society. Wetherell (2010) notes a distinct discursive turning point in the 1980s, which marked a change in focus in terms of identity research. No longer viewed as a stable or fixed concept, identity came to be understood as fluid. Wetherell (2010, p. 5) famously remarked that this was the point when "identity got complicated," noting its "slippery, blurred and confusing nature" (p. 3).

In broad terms, identity can be referred to as an individual's ideas about self and goes to the core of who one is (Browne, 2012). It is generally viewed as a multifaceted construct, incorporating one's "self-understandings and self-definitions" which give meaning to one's self (Schachter & Rich, 2011). Reluctant to offer a precise definition for the concept, Wetherell (2010) instead refers to it as a "site gathering together a wide range of concerns, tropes, curiosities, patterns of thoughts, debates around certain binaries and particular kinds of conversations" (p. 3).

### *2.3.2 Identity and its place within education research*

Within education research, identity has emerged as a valuable lens through which to explore students' experiences, perceptions of themselves and relationships with learning. This sub-section aims to contextualise identity within the broader field of education, highlighting key conceptual contributions that have shaped its use in educational research.

Identity is increasingly understood not as a fixed internal trait, but as something that is formed, negotiated and expressed in social and cultural contexts. In the context of education, Wenger (1998) views identity as "a way of talking about how learning changes who we are and creates personal histories of becoming in the context of our communities" (p. 5). The same author asserts that identity is crucial to the learning process, influencing what matters for students and what does not, bringing together experience and competence "into a way of knowing" (Wenger, 2000, p. 239). From this perspective, learning and identity are fundamentally interwoven. Learning is not just the acquisition of knowledge or skills, but a process through

which students come to see themselves, and be seen, in particular ways. This becomes especially pertinent in subject-specific contexts, such as mathematics education, where particular forms of competence can often be narrowly defined and where students' participation may be shaped by how well they are seen to align with these ideas. This interwoven view of identity and learning is also reflected in a view by Schachter and Rich (2011) who, in emphasising the role identity plays, refer to its over-arching presence across academic and social-emotional education related issues.

In a related strand of research Gee (2000) proposes a framework of four interrelated identity perspectives, that of "nature", "institution", "discourse" and "affinity", with each one intertwined. The author suggests that "all people have multiple identities connected not to their 'internal states' but to their performances in society" (Gee, 2000, p. 99). His work highlights the discursive nature of identity in educational contexts, where what students say and how they are spoken about plays a key role in identity formation. Importantly, Gee (2000) suggests that these identities are enacted in relationship with institutional structures, peer cultures and wider social norms, all of which are at play in the school environment.

Other scholars have further explored the ways identity operates across academic and social-emotional dimensions of schooling. Schachter and Rich (2011), for example, note that identity is often an implicit concern in education research. Even when not explicitly named, it is present in studies of belonging, motivation, autonomy or behaviour. They argue for greater attention to how identity processes unfold in everyday educational practice, particularly during moments of change or challenge, such as school transitions. While much of this work focuses on cognitive and social processes, researchers have also pointed to the role of emotions in shaping identity. Zembylas (2003) highlights how emotional experiences are intertwined with how individuals construct and negotiate their sense of self.

In sum, identity in education is now widely viewed as dynamic, relational and situated in practice. It is produced through participation in classroom life and through interactions with peers, teachers and institutional structures. This broader framing creates a valuable bridge to more specific conceptualisations of subject-related identities, including mathematical identity, which is explored in the next sub-section.

### *2.3.3 The emergence of mathematical identity*

Mathematical identity has increasingly emerged as a valuable construct for understanding how students relate to mathematics, how they see themselves as mathematical learners and how they are seen by others within mathematical contexts. This section traces the

emergence of the concept in education research and outlines how it has been approached. It highlights key themes in the literature, including how mathematical identity has been defined, the dimensions commonly associated with it and the broader shifts in research focus that have brought the concept to the fore.

Research associated with mathematical identity can be categorised in several ways. Firstly, studies in the area have a natural split between teacher identity and learner identity (Graven & Heyd-Metzuyanim, 2019). While learner identity is most relevant to this study, the area of teacher identity within mathematics, including that of pre-service teachers, holds important bearing for mathematics teaching and learning. A second distinction relates to theoretical perspective. As Darragh (2016) outlines, identity research in mathematics education typically draws from either psychological or sociological paradigms. The former tends to focus on internal beliefs, traits or attitudes, while the latter attends more closely to the social, cultural and discursive contexts in which mathematics learning takes place (Boaler, 2000). Finally, a third key variation lies in how mathematical identity is defined and operationalised. Some studies use broad or implicit definitions, while others explicitly articulate its components and influences (Radovic et al., 2018). These definitional differences have implications for both research design and interpretation and will be given more consideration in the next chapter.

Historically, research on mathematical identity often emerged from studies focused on related constructs such as attitudes, motivation and beliefs, particularly within psychologically oriented traditions (Larnell, 2016). However, with the “social turn” in mathematics education (Lerman, 2000), researchers began to shift toward viewing identity as socially constructed. With the emergence of sociocultural approaches, identity was viewed less of a “static, natural-core” entity and instead more of a “fluid, always-developing” process by which individuals are continually becoming (Larnell, 2016). This shift has brought renewed attention to the contextual and relational aspects of mathematics learning and impacts methodological perspectives and approaches.

Grootenboer and colleagues posit that mathematical identity can be seen as a collective term which encompasses important elements such as one’s affective relationship with the domain, their prior experiences and history with the domain and the cognitive aspect (Grootenboer et al., 2006). However, Darragh (2016) cautions against including affective dimensions within such a definition of mathematical identity, noting that such areas have their own importance within mathematical education research and rebranding them as identity only muddies the waters. Nevertheless, it is still argued that mathematical identity relates to a range

of issues which traditionally were incorporated under different affective domains, most notably in relation to students' persistence, motivation to learn and interest in the subject (Cobb, et al., 2009). As this study will explore, attention to identity allows for a more nuanced account of how students relate to mathematics and how that relationship evolves across their learning journey.

Specifically useful for researchers, identity can provide a useful bridge between mathematical learning and its sociocultural context (Sfard & Prusak, 2005). Furthermore, mathematical identity has been shown to be especially useful in examining particular facets in mathematical research, for instance learner's engagement within the discipline (Graven & Heyd-Metzuyanim, 2019; Solomon, 2007). In this light, investigating how students identify with mathematics can provide useful insight into the affective elements of their relationship with mathematics (Hannula, 2012) and how such relationships evolve over time.

However, as interest in mathematical identity has expanded, so too have questions about its conceptual clarity and consistency. In a review of literature of mathematical identity, Darragh (2016) laments the lack of an agreed definition of the term, with some studies in the area failing to state their understanding of what is meant by the concept. Radovic et al. (2018) similarly note that mathematical identity has been employed across diverse theoretical frameworks and methodological traditions, making synthesis challenging but also highlighting its richness and flexibility. In instances where definitions are provided, studies are sometimes deemed theoretically incompatible with that chosen definition (Darragh, 2016). A lack of an agreed definition or understanding runs the risk of the term becoming a "self-evident" notion (Sfard & Prusak, 2005). Brubaker and Cooper (2000) go further, criticising the use of identity in some studies, claiming it is "riddled with ambiguity, riven with contradictory meanings and encumbered by reifying connotations" (p. 34). It is therefore pertinent that a definition of identity and mathematical identity for this study is carefully considered and presented.

### *2.3.4 The importance of mathematical identity*

Situated within the affective domain of mathematical education research, identity is considered a meaningful and integrative lens for gaining deeper insights into students' mathematical learning. In highlighting the fusing role of mathematical identity, Sfard (2019) describes it as follows:

It comes as a kingpin with which to tie together what was long suspected to be merely parts of a single story. The discourse of identity is where the social, the individual, as well as the cognitive and the emotional are expected to meet and turn into inseparable, co-constitutive aspects of one phenomenon. (p. 556)

Mathematical identity is increasingly recognised as a valuable construct for capturing how students experience and make sense of their mathematical learning. It is considered important because it “draws together a range of elements that are integral to our understanding of mathematics contexts and learning spaces” (Grootenboer et al., 2006, p. 612), offering a holistic lens through which to explore the relational, contextual and emotional dimensions of mathematics education. This perspective is especially relevant during periods of educational change, when students must navigate new expectations, environments and experiences that can shape how they see themselves as mathematical learners. Exploring students’ mathematical identity can offer insight into how such transitions affect engagement and persistence. As Bishop (2012, p. 36) notes, identities “affect not only how we learn or fail to learn the subject matter at hand but also who we become - what we pursue, what makes us happy, and what we find meaningful.” Similarly, Sfard and Prusak (2005, p.19) label identities as being crucial to learning, citing their propensity to “act as self-fulfilling prophecies ... in determining whether the process of learning will end with what counts as success or with what is regarded as failure”.

Boaler and Greeno (2000) assert that a student’s mathematical identity is both present and constructed in the classroom and plays a significant role in influencing a student’s engagement with learning, aligning with Wenger’s (2000) interwoven views of identity and learning as mentioned previously. In presenting an interrelated view of identity that sits alongside knowledge and practice, Boaler and Greeno (2000) propose that each one is influential in mathematical learning. Many countries, including Ireland, hold mathematical proficiency as a key aim of education policy (National Research Council (NRC), 2001). One of the strands of mathematical proficiency, namely, productive disposition, holds particular relevance here. The NRC highlights that “students’ disposition toward mathematics is a major factor in determining their educational success” (NRC, 2001, p. 131). While the definition of the productive disposition is broader than what constitutes mathematical identity alone, the reference to beliefs about oneself as a mathematical learner holds specific pertinence.

Beyond its relevance to learning, mathematical identity is increasingly recognised for its role in exposing broader questions of power, equity and participation. Simpson and Bouhafa (2020) argue that identity research allows educators to confront issues such as the underrepresentation of women and minority groups in STEM fields by surfacing the social and cultural dynamics that shape one’s relationships with mathematics. In a systematic review of the field, Radovic et al. (2018) found that over 70% of studies exploring mathematical identity examined equity-related issues, with gender being the most commonly addressed dimension. These findings reflect the value of mathematical identity not only as a personal construct, but as

a sociopolitical one, capable of revealing how inclusion, exclusion and power operate in mathematics education.

### ***2.3.5 Mathematical identity and the transition to post-primary school***

As revealed above, the transition from primary to post-primary marks a period of considerable educational and social change for students. Although research into the transition from primary to post-primary school has explored a wide range of cognitive, social and emotional dimensions, mathematical identity remains a relatively underused construct in this context. Nevertheless, a very small number of examples exist that have sought to examine students' mathematical identities at this time.

Based in New Zealand, Darragh's research offers a nuanced exploration of mathematical identity during the transition from primary to post-primary. In her doctoral thesis *Raising the curtain on mathematics identity: The drama of transition to secondary school* (Darragh, 2014), she frames mathematical identity as a metaphor of performance, placing a particular emphasis on the social context in which it exists. Her study involved interviews with students and teachers, as well as classroom observations over the course of a 16-month period. She found that student's often adopted identities that were shaped by the classroom environment, performing as "quiet, individual listener[s]", as they operated "under constraints of the classroom stage and teacher direction" (Darragh, 2014, p. 175). She highlights, in particular, the challenges students face at this time and importantly positions these as structural, "And yet this is not a deficit of the student, rather it is a limitation of the stage, the direction, the theatre, or the available scripts generated by society and constructed within the figured world of mathematics learning" (Darragh, 2014, p. 175).

Darragh's (2013) article further builds on her doctoral research, exploring the views of students on being a mathematics learner, as well as the kind of mathematical identity they developed following their move to post-primary school. Drawing on student interviews that took place halfway through First Year, she analysed how their identities were shaped in the early months of post-primary school. The study found that students positioned themselves in particular ways based on their prior experiences, peer perceptions and the expectations associated with their new school environment. The author highlights the interrelatedness of mathematical identity, confidence and belonging, and how establishing a strong sense of belonging in a classroom, that also encourages meaningful participation, can help create a positive mathematics identity for students.

A more recent study in Norway sought to examine the construction of mathematical identities among students who were in their final months of primary school (Pettersen & Xenofontos, 2023). The participants were aged between 12-13, with interviews and focus groups used to collect data. A thematic analysis revealed three key themes that appeared to influence students' identity construction; popularity, effort and achievement. Centred around Sfard and Prusak's (2005) notion of actual and designated identities, the study put forward a model to conceptualise students' mathematical identities. The model presents an interrelated view of the themes of popularity, effort and achievement, with the authors summarising "pupils' participation and positioning in the mathematics classroom, as well as the effort they put in learning mathematics, may be affected by their perceptions of their social status" (Pettersen & Xenofontos, 2023, p. 11). This reinforces the idea that identity construction is not only shaped by individual dispositions but is deeply embedded in social dynamics within the classroom. Although focused solely on the final stage of primary school, the research offers valuable implications for how identity may continue to evolve and be challenged as students enter post-primary school.

Although limited in number, the studies above underscore the value of mathematical identity as a lens for exploring students' experiences during the transition from primary to post-primary school. This construct appears especially relevant at times of change, as students renegotiate their sense of self within new educational environments. The research shows how identity is shaped by social positioning and participation in new mathematical settings, something that will be explored further in the next sub-section.

### ***2.3.6 How mathematical identity is shaped and influenced***

Understanding how mathematical identity is shaped and influenced is central to recognising the complex ways students come to see themselves in relation to mathematics. Across the literature, social and cultural factors appear significant. Bishop (2012) puts forward a number of factors, including tasks, pedagogy and curriculum, that play a role in influencing mathematical identity. However, she cautions that such influence is neither consistent nor indeed predictable for learners, with individual students holding different identities, even when conditions appear uniform. Meanwhile, Trescott (2020) proposes four important factors in the school community that influence the development of students' mathematical identities, namely, pedagogical approaches, teacher expectations, peer influences and ability grouping, factors that have all arisen earlier in the chapter and that are considered particularly relevant to the primary to post-primary transition.

The central role of learning in shaping identity has been widely emphasised (Sfard & Prusak, 2005; Simpson & Bouhafa, 2020). Grootenboer and Zevenbergen (2008), for example, argue that students' mathematical identity is closely linked to their experiences of learning mathematics and this will continue to shape how they engage with the subject in the future. The kinds of activities students are exposed to, how mathematics is presented and the degree to which they can actively participate all influence identity development. Boaler and Greeno (2000) highlight how different pedagogical environments can give rise to distinct identity experiences. In their comparative study, students in a traditional, didactic classroom, despite performing well academically, expressed negative attitudes toward mathematics and a sense of disconnection from the subject. By contrast, students in a discursive, inquiry-based environment developed more positive relationships, with the authors finding no conflict in terms of their identity and the mathematical learning experiences. In a separate study examining mathematical identity formation in the context of different practices and activities, it was noted that students are "continually adjusting and readjusting themselves based on the resources that emerge in and across social contexts". The authors note that these moments of adjustment are significant in terms of identity negotiation (Hand & Gresalfi, 2015).

Specific to the move to post-primary school, particular attention has been drawn to how shifts in pedagogy and teacher roles shape students' emerging identity. Symonds and Galton (2014) identify the nature of classroom learning experiences and the pedagogical approaches employed as influential in how students construct their identity during this time. The move from generalist to subject-specialist teachers is significant. Teachers' pedagogical expertise and enthusiasm for their subject can introduce students to new ways of thinking and learning, which in turn may help to reshape how they see themselves as learners (Symonds & Galton, 2014). In a related study on musical learning, Symonds et al. (2011) found that the presence of specialist teachers in post-primary education not only supported learning but also acted as a stimulus for positive identity development. In this case, teachers often served as role models, inspiring students and shaping their aspirations. Although focused on music, these findings pose questions for learning more generally, around how teachers' pedagogy and teacher-student interactions can affect how students position themselves in relation to learning.

While classroom practices and learning experiences play a central role in shaping mathematical identity, they are not the only sources of influence. As Sfard (2019) argues, "the key to our identities lies in our inclusions in, and exclusions from, different communities" (p. 560). This broader social framing highlights how peer interactions and social positioning within learning environments can shape students' identity. For instance, Gholson and Martin (2014)

draw attention to the complex relationship between students' positions in peer hierarchies and their mathematical identity, noting how classroom dynamics and social affiliations can be deeply intertwined. Further and of particular relevance to this study, Bishop (2012) claims that for adolescents, social interactions are a critical aspect of identity formation within mathematics. Symonds and Galton (2014) also highlight such influences on identity, with friendships and the role students play in friendship groups considered important. Additionally, Browne (2012) warns that adolescents in particular can place higher priority on social relationships with their peers than on achieving high scores, reinforcing the view that one's identity can be indeed influenced by others, or at least concealed to a certain extent so as to undermine their achievements. Within their sociocultural conceptualisation of identity, Radovic and colleagues (2018, p. 5) consider "others" as central, with identity developing "in relation to others, using the voices of others, during a process in which individuals position themselves and are positioned by others".

Beyond the classroom, family background and parental influence also play a role in shaping mathematical identity. In a study of students aged four to nine, influence from home was noted in shaping the way students experience and relate to mathematics (Towers et al., 2018). In the study, the authors noted that, during interviews, students often used their parents' voices in describing their experience of school mathematics.

In summarising this subsection, what is clear, having stepped inside the identity maze, is the definitive need to articulate a definition and understanding of the concept. In tracking the emergence and indeed development of identity studies in the literature, the concept is associated with much debate, but has survived recent scrutiny to become a very rich and useful concept in research terms. The strong theoretical links between mathematical identity and learning offers scope to investigate a multitude of topics that seek to get to the heart of what it means to be a mathematical learner.

### ***2.3.7. Summary***

This section has traced the emergence and empirical applications of mathematical identity, situating it as a complex and powerful lens through which to understand students' relationships with mathematics. Mathematical identity offers particular value in capturing the affective, social and contextual dimensions of students' learning experiences with the subject. This would appear especially salient during times of transition, such as the move from primary to post-primary, when students' sense of self can often be in flux. The literature reviewed highlights that mathematical identity is shaped by a range of factors, from classroom practices and pedagogical approaches to peer relationships and wider social influences. Despite concerns

around definitional clarity, its ability to integrate affective, cognitive and sociocultural elements situates it as a useful and important construct in mathematics education research.

## 2.4 Conclusion

This chapter has explored the literature around the transition from primary to post-primary school, revealing an intricate interplay of social, emotional, curricular and pedagogical factors. The literature reviewed spans a wide body of work, reflecting the transitional experience as one of significant challenge, change and reorientation for students. While much of the research highlights difficulties, such as declines in motivation and disruptions to continuity in learning, I am mindful to ensure that the study will be built to capture all sides of the experiences of students, including those that may be positive.

Although some of the changes students encounter at this time may stem from broader developmental processes such as adolescence, they nonetheless intersect with educational structures, practices and relationships. These intersections can shape how students come to view themselves in relation to mathematics learning. The review has shown that mathematical learning is affected not only by what is taught but also by how it is taught. Changes in classroom practice, the introduction of subject-specialist teachers and new peers all appear to contribute to a new experience of mathematics during this period.

While acknowledging the various affective responses to mathematics, including attitudes, self-efficacy, motivation and anxiety, this chapter has also pointed to the value of mathematical identity as a broad, integrative concept through which students' relationships with mathematics can be understood. Taking account of the myriad of factors at play across the transition, mathematical identity brings together many of the emotional and social factors discussed. While its conceptual place within research is still unfolding, what is clear is its suitability and relevance in exploring an individual's deep relationship with mathematics. The next chapter will build upon this foundation, outlining how mathematical identity is conceptualised within this study and how it connects to the study's theoretical framework.

# Chapter 3: Theoretical and conceptual underpinnings

## 3.1 Introduction

Swanson proposes that the “theoretical framework is the structure that can hold or support a theory of a research study” (Swanson, 2013, p. 122). It comprises a theory or theories shared by experts in the area of interest of a study, offering a “theoretical coat hanger” for the data collection, analysis and subsequent interpretation of the results (Kivunja, 2018, p. 46). This study sits at the crossroads of the transition from primary to post-primary and students’ relationship with mathematics at this time. Mathematical identity is used as a key conceptual lens to capture and interpret how students make sense of themselves as mathematics learners during this significant period of change. As such, it is imperative that theoretical consideration is given to the multiple components of the study; the nature of identity and learning, and the transition itself.

This chapter sets out the theoretical and conceptual framework that underpins the study. It begins by articulating the research paradigm, before turning to sociocultural theory, positioning learning and identity as relational and situated within communities of practice. From here, it explores relevant theories of identity and transition. The final section presents the study’s conceptual underpinning, which integrates the constructs of mathematical identity and educational transition. Drawing on sociocultural perspectives and supported by Nicholson’s (1984) Transition Cycle, it positions mathematical identity and the transition as processes of becoming.

## 3.2 Research paradigm

In research terms, a research paradigm refers to a researcher’s “worldview” (Mackenzie & Knipe, 2006), the underlying set of beliefs and assumptions that shape how knowledge is perceived, how research is conducted and how data are interpreted. Classifying paradigms as human constructs, Denzin and Lincoln (2000) emphasise their importance in indicating the beliefs of the researcher, which influence what should be researched, how it should be researched and how the findings of the research should be interpreted. Furthermore, Lerman (2019, p. 314) similarly notes that theories, “as discourses, offer worldviews,” which suggests that theoretical positioning is not just a backdrop to methodology, but central to the coherence of the entire study.

Given this, I recognise the importance of explicitly articulating the assumptions underpinning this research. This study, concerned with students’ evolving relationships with

mathematics during a key educational transition, is underpinned by an interpretivist paradigm and a constructivist epistemology, reflecting my view that knowledge is socially constructed and situated in context.

### *3.2.1 An interpretivist paradigm*

A key facet of the interpretivist paradigm is the focus on understanding the subjective world of human experience (Guba & Lincoln, 1989). Kivunja and Kuyini (2017), conceptualising this approach as “an effort to get into the head of the subjects” (p. 33), highlight the importance of interpretation and meaning-making as central components. From my perspective, making sense of participants’ thinking and experiences is paramount. In this light, the interpretivist paradigm is underpinned by the belief that reality is socially constructed (Bogdan & Biklen, 1998). For this reason, it is sometimes referred to interchangeably with the constructivist paradigm.

Interpretivism holds that individuals construct meaning through their experiences and interactions within specific contexts. Creswell (2009) supports this view, emphasising that the goal of qualitative research is to “rely as much as possible on the participants’ views of the situation being studied” (Creswell, 2009, p. 8). He further notes the importance of open-ended inquiry and the researcher’s role as a listener and interpreter, and someone who seeks to understand participants within their cultural and historical contexts. These underpinning assumptions directly shape the methodological choices and theoretical framing of the study, and are reflected in the study’s broader epistemological and ontological orientation outlined below.

### *3.2.2 Epistemology*

For research purposes, the most important philosophical assumptions are often those concerning epistemology - the theory of knowledge that underpins how the researcher understands and interprets the world. Epistemology refers to assumptions about the nature of knowledge and how it can be acquired (Sarantakos, 2005), or more simply, “how we know what we know” (Crotty, 1998, p. 8).

This study adopts a subjectivist epistemology, where knowledge is understood to be constructed through individual experience. Knowledge is seen as inherently contextual and shaped by the social, cultural and historical environments in which individuals enact their lives (Denzin & Lincoln, 2005). It is not objective or separate from the knower but is formed through cultural and historical norms and through the interactions an individual has with others. From this perspective, the researcher uses their own thinking, informed by the interactions with the

participants, to make sense of the data (Kivunja & Kuyini, 2017). As such, the research process is primarily inductive, aiming to generate insights from the data rather than test pre-existing theories. Given the interpretivist commitment to understanding lived experience, a subjectivist epistemology provides a valuable foundation for exploring how students make sense of themselves as mathematical learners across the transition. It recognises the richness of students' accounts and supports a nuanced exploration of identity that is sensitive to context.

### *3.2.3 Ontology*

A particular epistemological stance implies a particular ontological stance and vice versa (Crotty, 1998), with both invariably linked. Ontology refers to the study of "being" and is concerned with "what is", and the nature of existence and the structure of reality (Crotty, 1998). Snape and Spencer (2003) describe ontology as relating to the nature of the world and what can be known about it. A key ontological question for researchers is "whether or not there is a social reality that exists independently from human conceptions and interpretations and, closely related to this, whether there is a shared social reality or only multiple, context-specific ones" (Ormston et al., 2014, p. 4).

As outlined later in this chapter, a sociocultural view of mathematical education situates learning within social contexts, emphasising collaborative participation and interaction with others. A relational ontology asserts that "being", or human existence, is constituted through relationships. Wildman (2010, p. 55) explains, "The basic contention of a relational ontology is simply that the relations between entities are ontologically more fundamental than the entities themselves." In this view, the self is socially situated and cannot be understood without reference to the "other" or "not I" (Crownover & Jones, 2018). In essence, a relational ontology acknowledges that we exist in relation to others, to cultural systems and the world around us. This view aligns closely with the present study, which seeks to explore how students' mathematical identity journeys are shaped during the transition from primary to post-primary school. As students navigate new educational contexts, their identities evolve through interactions with others and school structures. In this way, identity is not solely an individual entity, but a relational process and one that is formed through engagement with the social worlds of mathematics learning.

In summary, the interpretivist paradigm, underpinned by a subjectivist epistemology and a relational ontology, provides a coherent foundation for this study. These positions support a focus on meaning-making, situated experience and the socially embedded nature of identity, which are all central to exploring students' mathematical identity across the transition.

### 3.3 Theoretical framework: A sociocultural perspective on learning and identity

Lerman (2019, p. 310) proposes that “a successful research study at doctoral level can be achieved by working with one established theory and drawing on the body of work that appears in the literature for operationalization of that theory.” In this study, sociocultural theory provides that core theoretical frame, supporting coherence across the essential elements of the research, including the conceptualisation of mathematics learning and the understanding of mathematical identity.

When assessing theoretical perspectives and research methods across mathematics education, Schoenfeld (2002) noted the plethora of options. Singling out sociocultural theory, he described its “long roots” in the work of Vygotsky and his theoretical allies, who foregrounded learning as an outcome of social interaction. In conceptualising mathematical learning and identity from this perspective, the focus shifts from individual traits or abilities to the socially situated practices and discourses through which learners engage with mathematics.

#### 3.3.1 *A sociocultural perspective of learning*

At the heart of this study is the view that learning is not an isolated cognitive act, but a socially situated process shaped by interaction and context. This aligns with sociocultural theory, which foregrounds the role of social participation in the construction of knowledge. Rooted in the work of Vygotsky (1978), this perspective shifts the focus from what occurs solely “inside the head” to the dynamic interplay between individuals and their social worlds. Sociocultural theory positions learning as an inherently social and cultural activity that is intricately woven into the routines and interactions of daily life (Lerman, 2000; Wertsch, 1991). This perspective positions learning as participatory, relational and taking place in communities rather than a linear accumulation of isolated facts or concepts (Lave & Wenger, 1991). In this case, learning occurs as individuals take part in shared practices within their communities. Wenger’s (1998) theory of communities of practice offers a powerful elaboration of this process. It frames learning as a trajectory of participation, with students gradually becoming central members of the community over time.

Central to this view is Vygotsky’s (1978) assertion that all higher-order cognitive processes originate in social interactions before being internalised by individuals. This emphasises the value of dialogue, collaboration and mediation through cultural tools. From this point of view, learning is seen as the internalisation of shared cultural knowledge. It is a process through which individuals participate in, and reconstruct, the practices of the communities to

which they belong (Kieran et al., 2001; Vygotsky, 1978). In Wenger's (1998) framework, such communities are characterised by a shared domain of interest and mutual engagement among members. Learning, in this sense, involves becoming a member of the community by participating in its norms, tools, discourses and values. Furthermore, sociocultural theorists stress the situated and contextual nature of learning, emphasising that knowledge is always shaped by the cultural norms, social values and historical contexts within which it arises (Wertsch, 1991). Learners actively negotiate meanings through interactions, reflecting and building upon their prior knowledge and cultural understandings in response to new social and cultural contexts (Rogoff, 1990; Wenger, 1998).

Sociocultural theory emphasises that cognitive development is shaped by the use of cultural tools and practices (Rogoff & Chavajay, 1995). These tools can include symbolic systems, including speaking, writing, number systems, signs, concepts and memory techniques, and also material tools, such as computers. Such tools can be seen as transformative and impact the way one organises and processes information. For Vygotsky, these tools are not invented anew, but are instead "passed on and constitute the intellectual bequest of one generation to the next" (Cobb, 2006, p. 147). At the same time, these tools are not static in nature and can be developed and refined over time (Ivic, 1989).

Additionally, Radford (2008) places emphasis on the reflective aspect of learning within the sociocultural space. As well as the social dimensions as described above, learning is a result of reflexive and self-critical activities, as one's existing knowledge is transformed and built upon. This negotiation of learning as a reflexive process includes taking account of the actions and attitudes of others within the learning community (Mead, 1934).

### ***3.3.2 A sociocultural framing of mathematical learning***

In the midst of "theory proliferation", Lerman (2019) has called for coherence in theoretical applications within mathematics education research, cautioning against theoretical fragmentation. While not advocating for any theory in particular, what is most crucial for researchers is to consider theory: "I do expect a position to be taken in relation to working with theory or theories" (Lerman, 2019, p.323).

Sociocultural theory has gained notable prominence within mathematics education research over recent decades, marking what Lerman (2000) termed a significant "social turn". This shift, particularly evident from the 1980s to around 2010, saw mathematics education research increasingly move away from viewing mathematics learning primarily as an internal cognitive process, toward conceptualising it as deeply embedded within social interactions,

practices and contexts. This turn emphasised an explicit exploration of sociocultural factors, recognising how social contexts fundamentally shape mathematical actions, decisions and identity (Lerman, 2000). In applying sociocultural theory specifically to mathematics education, researchers have highlighted how mathematical knowledge emerges as learners actively engage with cultural tools in collaborative contexts (Cobb, 2006; Radford, 2008). Tools such as number systems, diagrams, algebraic symbols or manipulatives could all be classed as cultural artifacts in mathematics learning that mediate thinking and structure how mathematical knowledge is negotiated and constructed.

Furthermore, research within this sociocultural frame has demonstrated that mathematics classrooms function as communities of practice (Wenger, 1998; Boaler, 2002). Within these spaces, learners work in collaboration with each other to generate shared meanings through ongoing discourse and participation. These communities are characterised by a shared domain of knowledge (mathematics), mutual engagement among the students and teachers and a body of classroom practices and norms. As students participate in mathematical tasks and classroom dialogue, they take up and negotiate roles and expectations that shape both their learning and their emerging identities (Wenger, 1998; Yackel & Cobb, 1996). In this light, success in mathematics learning is not solely about acquiring individual skills or knowledge, but about effectively participating in the cultural practices valued by the mathematics classroom community (Lave & Wenger, 1991; Yackel & Cobb, 1996). The quality of this participation, whether central, peripheral or marginal, can influence how students come to understand themselves in relation to mathematics, as well as the opportunities they have to engage in meaningful learning.

Relatedly, sociocultural perspectives emphasise that the processes of learning mathematics and identity formation are deeply interconnected, occurring through interaction, language and social positioning (Sfard & Prusak, 2005). Within mathematics education, a social context describes a collaborative process of participation and interaction, with learning and teaching seen as social activities happening in the mathematics classroom. As individuals participate in such a learning community, they witness changes to their identity, relating to who they are;

Because learning transforms who we are and what we can do, it is an experience of identity. It is not just an accumulation of skills and information, but a process of becoming – to become a certain person or, conversely, to avoid becoming a certain person (Wenger, 1998, p. 215).

Identity and learning are viewed as interweaving threads or “aspects of the same phenomenon” (Wenger, 1998, p. 115), with each influenced by social practices and interactions. The very nature and quality of these experiences and relations are seen to strongly influence learning and the development of identity (Ewing, 2005). Students, in this case, are seen as active participants in the various social practices encountered in the mathematics classroom. Framing mathematics classrooms as communities of practice thus highlights the importance of participation and negotiated meaning, all of which are central to students’ experiences of learning. This framing provides a critical foundation for understanding how students experience shifts in mathematical learning and identity as they transition between educational contexts.

### *3.3.3 The transition process*

While the previous chapter outlined the transition from primary to post-primary education as a process involving change, it is important to also consider its theoretical underpinnings. From a sociocultural perspective, the negotiation between the individual and the social contexts is paramount. Linked with the previous section, where context and learning communities are central, the transition from primary to post-primary school involves students moving to a new community. This move requires students to renegotiate their position within new environments. From a community of practice perspective, this transition can be understood as a move between two distinct but historically related communities, each with its own norms and practices (Wenger, 1998).

As reflected in the previous chapter, Gorgorio et al. (2002) suggest that ‘transition’ should not be understood as a single moment of change, but rather as an ongoing experience of becoming. As individuals move between various social and cultural contexts, they experience both disruptions and negotiations. The same authors suggest that transitions emerge from the need to engage with diverse social and cultural settings (Gorgorio et al., 2002). As individuals move between these contexts, they are required to adapt their behaviours, identity and ways of participating in response to new expectations and norms. The way in which one adapts to these different contexts can have a significant impact as to whether they experience a positive transition. For students moving from primary to post-primary mathematics, this may involve shifting from one set of classroom practices and expectations to another, requiring adjustment to previous learning and experiences.

Sociocultural theory offers a broad conceptualisation of the transition process, acknowledging the evolving nature of identity and learning across time and contexts. It enables an understanding of both the individual's personal experiences during the transition and the

influence of others, tools and resources (Williams, 2015). In this way, sociocultural theory provides a lens through which these dynamics can be understood in greater depth, offering a platform to explore the individual's sense of self. Williams (2015) highlights that the experience of transition can be considered as a personal project for each student, involving reflection, change and adaptation. As students experience the transition, they are "becoming someone or something new" (Beach, 1999, p.12). Thus, considering the importance of spotlighting the individual across the transition, sociocultural approaches provide a useful frame to examine the internal processes and shifts that occur within (Williams, 2015).

Beach's (1999) concept of lateral transitions further supports this framing. He describes such transitions as those that occur when an individual "moves between two historically related activities in a single direction" (p. 114). In the context of this study, the transition from primary to post-primary school can be viewed as a lateral shift, as one setting and set of practices are replaced by another, with an expectation of developmental progression. This perspective highlights both surface changes (e.g., timetable structures) and deeper practices and relationships that students navigate. Importantly, it draws attention to students' personal efforts to adapt and reposition themselves in a new environment. Wenger (1998) describes how individuals moving into a new community may initially engage in "peripheral participation," gradually working toward fuller membership. However, without appropriate support or recognition, students risk becoming marginalised and excluded from meaningful participation and practices that shape learning and identity.

### ***3.3.4 Mathematical identity in sociocultural context***

As outlined in the previous chapter, mathematical identity is increasingly used as a lens to explore how students make sense of themselves as mathematics learners. However, it remains a concept that is defined and theorised in different ways across the literature. As previously mentioned, psychological perspectives often present identity as a relatively stable self-concept or set of traits, emphasising internal characteristics. In contrast, this study draws from a sociocultural perspective, which foregrounds the role of context, interaction and participation in shaping how individuals come to see themselves and are recognised by others.

From this viewpoint, identity is not something an individual possesses, but something that is negotiated and enacted through social and cultural activity. As Holland and Lachicotte (2007, p. 104) describe, identity reflects the "sense of oneself as a participant in the social roles and positions defined by a specific, historically constituted set of social activities." Wenger (1998), similarly, emphasises identity as a trajectory of participation in communities of practice,

highlighting how individuals become recognised, or not, as competent participants within particular social contexts. These identity trajectories shift as learners engage in different forms of participation, shifting their sense of belonging and competence within a given community. Gee (2000) adds that identity is shaped by the ways people are positioned by discourse, both how they speak about themselves and how they are spoken about by others. These perspectives align with the sociocultural view of learning outlined earlier in this section, where learning and identity are seen as interrelated. As students engage in mathematical practices, they not only develop knowledge but also come to understand who they are and who they are becoming, in relation to mathematics. In the mathematics classroom, this means that students' mathematical identity is not static but shaped by their interactions in the classroom. These interactions would include participation in shared activities and practices, interaction with peers and teachers, engagement with mathematical tools and resources, and the norms that define what it means to be successful in mathematics. Together, they form the repertoire of a classroom community, through which students make sense of their roles and value as mathematics learners (Wenger, 1998).

This sociocultural framing has led to increased interest in how mathematical identity is negotiated and expressed through language. Sfard and Prusak (2005) argue that identities can be understood as collections of narratives and stories that individuals tell about themselves or are told about them by others. These narratives are powerful tools that shape how people think, feel and act within a particular domain. In the case of mathematics, students' identity is influenced by the stories they internalise about ability, past experiences and how they are positioned by peers, teachers and broader cultural discourses about who is "good at maths". Gee (2000, p. 99) proposes that identity is best understood as "being recognised as a certain kind of person in a given context," drawing attention to the discursive and relational processes through which identities are enacted and affirmed. Over time, the stories students internalise can solidify into patterns of identification with mathematics (Boaler & Greeno, 2000; Sfard & Prusak, 2005). From this perspective, mathematical identity is rooted in social interaction and recognition.

In the context of mathematics education, students' identity is shaped through their participation in classroom practices and the meanings that are socially attached to mathematics. As Heffernan et al. (2020, p. 3) observe, students construct their mathematical identities in relation to "social roles and cultural notions regarding what mathematics is" within the classroom context. This view foregrounds the interaction between individual learners, the practices of mathematics education and the broader sociocultural environment in which those

practices are embedded (Grootenboer et al., 2006). As a useful summary and to further clarify the sociocultural view of identity, Vadeboncoeur and Portes (2002) identify three foundational assumptions. Firstly, they propose that identity is “dynamic” and “fluid” in nature. Secondly, identity is shaped through ongoing negotiation between individual and context, while finally, identity is mediated through discursive practices (Vadeboncoeur & Portes, 2002, p. 92). Overall, these assumptions offer a clear lens for understanding identity as socially situated and evolving, particularly relevant for examining how students come to understand themselves in relation to mathematics. These theoretical foundations inform the study’s approach to defining and analysing mathematical identity, as it unfolds during the transition from primary to post-primary school.

### *3.3.5 Summary*

In this section, I have outlined the sociocultural theoretical framing that underpins the study. Learning is understood as a process of participation in culturally and historically situated practices. Drawing on the work of Vygotsky, Lave, Wenger and others, sociocultural theory positions learning as socially mediated, shaped by interaction, context and the use of cultural tools and practices. Within mathematics education, this perspective repositions the mathematics classroom as a community of practice, where learners construct knowledge through shared participation, negotiation of meaning and engagement with mathematical discourse and tools. Success in this context is not defined solely by individual achievement, but by one’s ability to participate meaningfully in the valued practices of the community. Mathematical identity, in turn, is shaped by these experiences of participation and recognition. It is understood as dynamic, relational and context-dependent.

Sociocultural theory also provides a valuable lens through which to understand the transition from primary to post-primary school. This period is conceptualised as a lived and evolving process of becoming. As students move between educational settings, they cross boundaries between distinct communities of practice, with each having its own roles, discourses and expectations. These shifts require learners to renegotiate their place within new contexts and can lead to changes in how they see themselves as mathematics learners.

Taken together, these theoretical perspectives inform the study’s approach to understanding how learning and identity intersect during a key period of educational change. They support a nuanced interpretation of students’ experiences and offer a foundation for examining how mathematical identity is shaped during this time.

### 3.4 Conceptual framing of identity and transition

A conceptual framework provides a structure through which to examine the problem under study in an integrated and coherent way (Liehr & Smith, 1999). Central to this study is the concept of mathematical identity, being used as a lens to explore students' relationship with mathematics. This exploration is focused on a very important period on their educational journeys – the primary to post-primary transition. Both constructs, identity and transition, are understood from a sociocultural perspective as dynamic, relational and shaped through participation in social contexts. This section draws on existing literature to define and frame these concepts in ways that reflect the theoretical underpinnings of the study, as outlined above, and ensure that the lived experiences of students remain central.

#### 3.4.1 *Mathematical identity*

In seeking to conceptualise mathematical identity for this study, it was important to consider how the construct is treated across existing literature. As discussed in the previous chapter, identity is a concept used widely across fields, and even within education research, definitions vary considerably. Research on mathematical identity is marked by a diverse range of perspectives and analytical approaches. This variation, while reflecting the richness of the construct, also presents challenges for research design and interpretation. This section describes the specific lens adopted in this study, including a working definition and a reflection on its core components.

**3.4.1.1 A three-dimensional viewpoint.** To address the complexity and variation in how mathematical identity is conceptualised, Radovic et al. (2018) conducted a systematic review of literature in the area, examining how the concept is defined and operationalised in studies. The authors highlight the approach sometimes taken in which a single definition is presented within a study that discards different or contesting views. While this can, on the surface, appear to solve the conceptual coherence issue, it can have important theoretical and methodological ramifications. It is necessary that a thorough examination of many different factors is completed before arriving at a definition. In this light, the authors propose a three-dimensional framework that can be used to analyse and compare different conceptualisations of mathematical identity across the literature. It contains three central dimensions which encompass defining features of identity, namely, “a subjective/ social dimension, a representational/ enacted dimension and a change/ stability dimension” (Radovic et al., 2018, p. 26), each is explored below.

The first aspect concerns the subjective and social side to mathematical identity. This includes references to 'self', 'senses' or 'experiences' across definitions of the concept and

would align with the literature in the previous chapter pertaining to the concept of identity in its own right. The reference to 'self' also positions identity as a concept that is individual in nature. This emphasis originates in psychological perspectives, where there is a particular focus on the individual (Grootenboer et al., 2006). Alongside this, the social aspect of mathematical identity is highlighted as a common feature of definitions (Radovic et al., 2018). The concept emerges in social practice and can be recognised in such social settings by others. This coincides with views from Darragh (2016) in which the author calls for a definition that "takes a sociological perspective and enables analysis that takes account of the wider context". This view positions participation and engagement with others as key influences. This influence is especially strong for adolescents who take their cues for who they are becoming, in large part, on the basis of how others treat them (Erikson, 1968, p. 128). Identities are continuously negotiated within specific contexts and communities, and considerate of past life experiences (Gee, 2000; Wenger, 1998).

Secondly, the representational dimension refers to a view of identity as an expressive entity, which can be represented by language or discourse. This includes narratives that individuals use to describe themselves with respect to mathematics (Hall et al., 2018) or the stories told by people (Sfard & Prusak, 2005). Such a narrative focus appears prevalent in the research, much of which can be traced back to significant studies by Martin (2000) and Sfard and Prusak (2005), and will be explored further in the subsequent section. Identity may also be expressed through actions or engagement, with language not a necessary factor.

The final dimension relates to the notion of how mathematical identity can change, with Radovic and his colleagues (2018, p.26) noting that most studies viewed identity "as being constructed through a process, and consequently, learnt and open to change." This aligns with Bishop's (2012) view of mathematical identity being malleable and fluid in nature. Such a quality is particularly important when conceptualising mathematical identity as it implies it as being temporary in nature and subject to change over time (Radovic et al., 2018). Indeed, few studies in the review characterised identity as relatively stable, instead many studies explore how it is constructed, how it shifts and also unravels across time, with some including specific circumstances in which change can occur (Radovic et al., 2018). In considering "comfortable, routinized, and seemingly innate identities", Bishop (2012, p. 38) posits that these too were once "malleable and co-constructed in social contexts". However, repeated patterns of behaviour can stabilise identities to an extent, sometimes constraining how an individual participates in, or reacts to, a certain situation. This process is sometimes referred to as identity "thickening" (Holland & Lave, 2001).

**3.4.1.2 Conceptual approaches.** In addition to proposing a three-dimensional framework, Radovic et al. (2018) also identified five broad categories through which mathematical identity is conceptualised in existing studies, namely; “identity as individual attributes, identity as narratives, identity as a relationship with specific practices, identity as ways of acting and identities as afforded and constrained by local practices” (Radovic et al., 2018, p.28). Considering my own perspectives on mathematical learning, as outlined in the next chapter, and importantly the context of the primary to post-primary transition, these categories are further considered before a definition and conceptualisation of mathematical identity is outlined.

Viewing mathematical identity as an individual attribute reflects the subjective end of the social/subjective dimension as discussed above, in which studies place a particular focus on oneself and the individual attributes of identity (e.g. Axelsson, 2009). The second category, identity as narratives, emphasises its expression through personal stories. Rooted in the seminal works of Sfard and Prusak (2005), this category foregrounds the narratives of participants as windows into their identity. In this area, Lutovac and Kaasila (2011, p.227) propose that mathematical identity can emerge through “telling or writing stories about one’s relationship to mathematics, its learning and teaching”. Thirdly, a cohort of studies viewed mathematical identity through the lens of the relationship that people have with a specific mathematics practice or pedagogical focus. Solomon (2007), for instance, sought to investigate third-level students’ mathematical identity against the backdrop of participatory pedagogy. The fourth category views identity as ways of acting. Conceptualising it in this way allows researchers to examine participants as they position themselves in relation to mathematics, to fellow peers and to learning discourse (Anderson & Wagner, 2019). Finally, mathematical identity is conceptualised in some studies by the extent to which identity development is constrained within a particular context. One such study in this area (Cobb et al., 2009) conducted a design experiment involving two mathematics classrooms at post-primary level. One classroom had the constraints of content coverage and teacher accountability, whereas the other did not. The study documented how microcultures in the classrooms had influence over the developing identity of students, highlighting the students’ “views about and appraisals of how the classroom works” (Cobb et al., 2009, p.64).

The three dimensions and five conceptual categories offer a useful scaffold for mapping the diverse conceptualisations of mathematical identity found in the literature. Building on this foundation, the working definition of mathematical identity adopted in this study is shaped by its sociocultural orientation and further perspectives outlined in the next sub-section.

3.4.1.3 Narrative and enactivist perspectives. Before defining mathematical identity, it is important to acknowledge two interpretive perspectives that further shape how identity is understood and explored methodologically: narrative and enactivist theory. While sociocultural theory forms the core of the study's conceptual framing, these additional perspectives illuminate how identity is constructed, lived and expressed in context.

From a narrative perspective, identity is not seen as a fixed internal trait, but rather as something constructed and conveyed through the stories individuals tell about themselves (Sfard & Prusak, 2005). These personal narratives are always shaped by broader social and cultural discourses, reflecting the interplay between individual self-understanding and the expectations, norms and values of the communities they inhabit. Drawing on Clandinin and Connelly's (2000) framework, narrative inquiry was understood as operating within a three-dimensional space: the personal and social dimension which focuses on interaction, a representation of past, present and future or continuity as the second dimension and finally place or situation as the third dimension. The authors state that:

Using this set of terms, any particular inquiry is defined by this three-dimensional space: studies have temporal dimensions and address temporal matters: they focus on the personal and the social in a balance appropriate to the inquiry: and they occur in specific places or sequences of places. (Clandinin & Connelly, 2000, p. 54)

In this way, students' mathematical identities are not static attributes but evolving narratives that take shape over time and in response to shifting contexts. This narrative perspective highlights the dynamic and situated nature of identity, aligning with the study's interest in how students make sense of themselves as mathematics learners during a time of change. It offers a valuable lens for exploring identity as both individually meaningful and socially constructed.

Enactivism offers a complementary lens, emphasising the dynamic and emergent nature of identity. Rooted in cognitive science and phenomenology (Varela et al., 1991), enactivist theory has been linked to Bateson's (2000) ecology of mind theory, in which organisms and their environment are viewed as one intertwined system, as opposed to being independent of each other. In essence, enactivism focuses on an individuals' interaction with the world. Enactivist views of cognition are based around the idea that humans interact with the world by making sense of it (Read & Szokolszky, 2020), with the focus on the "interconnections between the individual and their environment" (Davis, 1995).

Enactivism within mathematics education research has gained traction in the last decade, with "Enactivist methodology in mathematics education research" featured as the standalone

theme of the ZDM – Mathematics Education journal in 2015 (Issue 2, April 2015). When applied to mathematical learning, it views the student and their learning intertwined within their environment, which include the “much broader contextual milieu in which students are immersed” that shape one’s relationship with the discipline (Towers et al, 2018). In keeping with sociocultural theory as outlined above, Lerman (1996) reminds us that sociocultural theory builds “on the notion that individual’s cognition originates in social interactions”, with the role “of culture, motives, values, and social and discursive practices are central, not secondary” (Lerman, 1996, p. 4). Through the lens of enactivism, one’s identity is developed in relation to one’s environment (Sridharan, 2015). This environment includes a range of factors, “including other people and therefore constitutes a course of perturbations for each learner and, simultaneously, each learner constitutes a source of perturbations for others and for the learning environment” (Hall et al., 2018, p.186). Accordingly, identity is viewed as being constructed and developed through a dynamic process and open to undergoing continuous change. Indeed, enactivism views identity as the very process of change itself (Davis, 1995).

Taken together, narrative and enactivist perspectives complement and deepen the study’s sociocultural framing of identity. Both emphasise identity as a dynamic and relational process that emerges through participation and is enacted through interaction with others and the environment. While sociocultural theory provides the core foundation for conceptualising mathematical identity, these additional perspectives contribute to the theoretical coherence of the study by aligning with and extending its key assumptions. They highlight how identities are lived, expressed and negotiated in context. Their inclusion reflects a commitment to understanding identity not as a static attribute but as an unfolding process that is attuned to personal meaning and situated experiences. This framing influences both the conceptual orientation and the methodological approach of the study, that will be outlined in the next chapter.

**3.4.1.4 Study definition.** As evidenced above, researchers have grappled not with whether mathematical identity is a valuable construct for understanding students’ relationships with mathematics, but with how best to define it. What emerges from the literature is that mathematical identity is a multifaceted construct, encompassing both personal and social dimensions. As discussed in the previous chapter, critique has been levelled at some research that fail to provide a definition of mathematical identity (Darragh, 2016). As such, I feel it is important to clearly set out a definition and propose a clear understanding of what is meant by the concept in the context of this study.

For the purposes of this research, I draw on Bishop's (2012) framing of identity as "a dynamic view of self, negotiated in a specific social context and informed by past history, events, personal narratives, experiences, routines, and ways of participating" (p. 38). In a more subject-specific formulation, Bishop also defines mathematical identity as "the ideas, often tacit, one has about who he or she is with respect to the subject of mathematics and its corresponding activities ... includes a person's ways of talking, acting, and being and the ways in which others position one with respect to mathematics." (Bishop, 2012, p. 39). Taken together, the definitions emphasise the malleable quality of mathematical identity, its accessible nature, while also foregrounding the social context as being important. Aligning with the sociocultural perspectives underpinning this study, Bishop's framing is particularly appropriate for a study focused on the primary to post-primary school transition. It allows attention to be paid to students' self-perceptions and the ongoing negotiation of identity across time.

**3.4.1.5 Key features of study's conceptualisation.** The study's conceptualisation of mathematical identity is shaped by three interrelated ideas: that identity is socially negotiated, dynamically constructed and meaningfully accessed through narrative.

***Negotiated in social contexts.*** Heeding the warning from Radovic and colleagues (2018) on over-emphasising the subjective and individual nature of mathematical identity, the conceptualisation above accommodates the social context in mathematical learning. As a researcher, my approach to examining mathematical identity is informed by the principle that it is socially negotiated. Sitting within a sociocultural theoretical framework, in which social roles and cultural norms relating to mathematics are foregrounded, one's sense of self is generated through social processes. Indeed, the engagement the individual has with social activities and experiences puts emphasis on what it means to do mathematics in a community. Additionally, of importance here is the need to recognise how mathematics learning and teaching cannot be divorced from the broader organisational, societal and cultural contexts within which they occur (Cantley et al., 2020). This coincides with Darragh's (2016) call for a definition that "takes a sociological perspective and enables analysis that takes account of the wider context" (p. 20), something I consider pertinent across the transition process.

Students approach learning with cultural models of what mathematics is, how it should be learned and its use in life. I think it is important to acknowledge that while mathematical identity may not go so far as to capture the full impact of such cultural factors on mathematical learning, it may in part reflect such cultural phenomena. Of note also is the role that social interaction and participation in mathematical activity play in the ongoing negotiation of identity.

However, in placing a focus on a narrative perspective, to be outlined further below, the focus is on how participation is reflected in individual narratives rather than on the activity itself (Radovic et al., 2018).

Finally, when conceptualising mathematical identity, viewing its development or existence in the form of a negotiation is of importance. As Kaasila (2007) notes, mathematical identity is “something that people use to justify, explain and make sense of themselves in relation to mathematics and to other people acting in mathematical communities” (p. 374). In this sense, identity is a negotiated construct.

***Malleable nature.*** A cornerstone of this study’s conceptualisation of mathematical identity is its malleable nature. Rather than being fixed, identity is seen as continuously shaped by context, experiences and interactions. As students navigate new contexts, such as the move from primary to post-primary school, their sense of self may shift, stabilise or take new forms. Such shifts prompt changes in how students see themselves in relation to mathematics. Importantly, this perspective allows for complexity and change. As Hall et al. (2018) note, identity may contain multiple voices, some confident with others uncertain, that can coexist or compete over time. Recognising identity as dynamic allows for a more nuanced understanding of how students relate to mathematics, as this study sought to capture the complexity of students’ lived experiences across the transition process.

This dynamic perspective aligns closely with sociocultural understandings of identity as negotiated over time and through participation in various social contexts (Holland et al., 1998; Wenger, 1998). In this sense, identity is not a stable end point, but an ongoing act of “identifying” (Heyd-Metzuyanim & Sfard, 2012), a process through which individuals negotiate a sense of who they are. In choosing a similar understanding, Larnell (2016) highlights the implications this view can have for research methodology, shifting attention from static traits to richer accounts of lived experiences. While this will be explored in more detail in the next chapter, viewing students’ mathematical identities as an unfolding process or a negotiation of self will undoubtedly influence how data is collected and subsequently analysed.

***Narrative as representation.*** In terms of representation, this study conceptualises identity as something meaningfully explored through the narratives individuals tell about themselves. Positioned firmly within the “narrative” category described earlier, this framing places emphasis on the stories individuals construct and share about their mathematical experiences. Acknowledging the fluid nature of identity, narratives allow individuals to express experiences or events that were particularly meaningful or formative (Howard et al., 2019). In

this study, such narratives are considered to be re-assembled during the act of recollection, a process that maintains the malleable, interpretive quality of identity (Radovic et al., 2018).

Martin (2006, p. 206) describes mathematics identity as “expressed in its narrative form as a negotiated self”, with such narratives accessible and open to analysis. These narratives are constructed by individuals and shaped in dialogue with others. Importantly, this aspect of how identity is conceived has implications for the methodology of the study, as presented in the next chapter. The widely cited work of Sfard and Prusak (2005) goes further, proposing that identity does not merely reside in narratives but is the narrative. They define identity narratives as “reifying, endorsable, and significant,” and describe their model as a potential “missing link” between learning and its sociocultural context (Sfard & Prusak, 2005, p. 15). While influential across research, including this study, the perspective has also drawn criticism. Some scholars argue that the three narrative properties are vague and have questioned the limits of narrative as a sole representation of identity (Graven & Heyd-Metzuyanim, 2019), suggesting that this risks oversimplifying the richness of lived experience.

In response, I adopt a position that is both appreciative and cautious. While Sfard and Prusak (2005) proposed that identity is the narrative, more recent work suggests a more layered relationship between the two (Eaton et al., 2013). I follow this latter approach, viewing identity and narrative as intimately connected but not synonymous. Narratives provide a valuable lens for accessing identity, which may be viewed as a story-bound expression of identity in development (Kaasila, 2007) or an “enactment of identity” (Radovic et al., 2018, p. 29). This framing resonates with Holland et al.'s (1998, p. 3) insight that “people tell others who they are, but even more important, they tell themselves and then try to act as though they are who they say they are.” In this sense, identity is shaped through internalised stories that emerge in social interaction (Holland & Lachicotte, 2007), making narrative a valuable expression of identity and a vehicle for its continued negotiation.

**3.4.1.6 Summary.** In pulling together the key aspects of identity for this study, it is important to acknowledge that mathematical identity can be conceptualised in a variety of ways. In this study, students’ mathematical identity is understood to be socially constructed, fluid in nature and reflected through the narratives they construct about their experiences. Identity is not fixed but is dynamically negotiated and reinforced through social interactions and experiences within specific contexts. This framing supports an interpretation of students’ experiences that is sensitive to the evolving nature of their self-understanding as mathematics learners.

### 3.4.2 Transition

While the transition from primary to post-primary school is often framed in policy and practice as a discrete move between educational settings, this study adopts a broader understanding. Drawing on a sociocultural perspective, transition is conceptualised here as a complex and extended process of adaptation and negotiation. This framing aligns with the overall aims of the study, which seeks to explore how students experience and make sense of themselves as mathematics learners during this significant educational shift.

**3.4.2.1 Transition as a process of becoming.** Building on the sociocultural framing outlined earlier, transition is understood as a process of becoming. Transition is seen as a time of disruption and negotiation, during which individuals encounter new cultural norms and expectations and work to adapt their practices and sense of self accordingly (Beach, 1999; Gorgorió et al., 2002; Williams, 2015). In my study, the transition from primary to post-primary school is understood as a lateral transition (Beach, 1999), involving movement between two historically related but socially and culturally distinct communities of practice. This framing, as discussed in the theoretical framework, highlights transition as a context in which identity is actively negotiated. This conceptual understanding informs the study's methodological design, particularly in its attention to how the transition unfolds over time and the ways students narrate and make sense of this movement.

**3.4.2.2 Nicholson Transitions Cycle framework.** To support the study's exploration of how transition unfolds over time, I draw on Nicholson's (1987) Transition Cycle as a heuristic tool. Originally developed in the context of workplace role transitions, the model has been adapted by education researchers to examine the primary to post-primary transition (e.g. Galton & McLellan, 2018; Symonds & Hargreaves, 2016). The framework outlines four overlapping phases: preparation, encounter, adjustment and stabilisation. In this study, the model is not applied prescriptively, but is used to support temporal framing, guide elements of research design and assist in the interpretation of findings. Based on existing literature and the specific focus of this study, the following section offers an alignment of Nicholson's four phases with the transition period as experienced by students moving from Sixth Class into the early stages of post-primary school. Table 3.1 summarises the indicative timeframe associated with each phase.

**Phase one: Preparation.** In advance of the move to a new setting, such as post-primary school, students will aim to prepare and move towards a state of readiness. Taking place during the second half of Sixth Class, students anticipate what post-primary school will be like, often weighing up their own strengths and weaknesses alongside these anticipations. As alluded to in

the previous chapter, students can often feel anxious and also excited about the move, with many unknowns at play in terms of what lies ahead (Galton & McLellan, 2018).

**Phase two: Encounter.** As individuals enter a new setting, they make first impressions. While processing significant new information, students can experience a number of emotional and perceptual reactions (Symonds et al., 2011). Beginning when students enter their new post-primary school, typically during the first term of First Year, they are met with a range of unfamiliar experiences. Within this phase, some students may feel overwhelmed, while others may experience a “honeymoon period”, as discussed in the previous chapter. An important part of this stage is how individuals cope with the new environment. Nicholson (1987, p. 187) recommends that individuals have “a map, a bicycle and good weather” to help navigate this phase.

**Phase three: Adjustment.** The third phase sees individuals have space to process, adapt to and interpret their new surroundings. For the move to post-primary school, this would include students becoming accustomed to an array of new experiences and expectations for learning, teaching and assessment. Adjustments may be required, with individuals sometimes needing to change to fit the new environment or attempt to make it fit with their own needs (Nicholson, 1987). While an exact time frame is not provided by Nicholson as to how long this phase lasts, Symonds and colleagues (2011) propose that by the second term in First Year, most students are becoming adjusted.

**Phase four: Stabilisation.** The final phase of the framework involves a stabilisation of the needs of the individual and the new environment. The feelings and behaviours that are present at this stage indicate how well the individual has settled into and adapted to the new environment. In this study, stabilisation is interpreted as a point at which students have begun to internalise the norms and structures of post-primary mathematics and to form a more established sense of their place within it.

*Table 3.1: The Transitions Cycle framework applied to the transition from primary to post-primary school*

Phase	Preparation	Encounter	Adjustment	Stabilisation
<b>Time frame</b>	Second and third term of Sixth Class in primary school	First term of First Year in post-primary school	End of second term of First Year in post-primary school	Final term of First Year in post-primary school

As discussed above, in this study, this framework will be used to aid the research design and will be used in the interpretation of the findings. This framing will inform the study's methodology, as outlined in the next chapter.

### **3.4.3 Summary**

This section has outlined the conceptual framing of the study, focusing on mathematical identity and the transition. Each construct is defined by key characteristics. Mathematical identity has been conceptualised as socially negotiated, malleable and represented through narratives. Transition, in turn, is understood as a process that unfolds over time and is shaped by students' participation in educational communities. At their intersection sits a process of becoming, capturing the dynamic and negotiated nature of students' experiences as they navigate this important time. Together, these conceptualisations inform how the study explores students' mathematical experiences across the transition from primary to post-primary school.

## **3.5 Conclusion**

This chapter has outlined the theoretical and conceptual underpinnings of the study, providing a coherent framework for exploring students' mathematical identities during the transition from primary to post-primary school. Positioning the study within an interpretivist paradigm supports a focus on the lived experiences of students.

The study adopts sociocultural theory as its core theoretical frame. This puts a lens on experiences, practices, discourses and communities through which learning and identity are negotiated. This stance brings clarity and coherence to the study's interest in participation and the contextual nature of becoming a mathematics learner. At the same time, it embraces the complexity of mathematical identity as something not fixed or easily measured, while also recognising that transition cannot be fully understood through structural milestones alone. To navigate the conceptual complexity of identity and transition, the chapter presents a framing that integrates these constructs. Mathematical identity is framed as socially negotiated, dynamic and narratively expressed. Meanwhile, the transition is positioned as a process of becoming, marked by change, adaptation and identity negotiation across shifting communities. The use of Nicholson's Transition Cycle, while not without its limitations, provides a practical tool to scaffold the temporal unfolding of students' experiences.

These theoretical and conceptual perspectives inform the study's design and its focus on how students make sense of themselves as mathematics learners. Emerging from these perspectives, the next chapter will outline the methodological approach taken in the study. It

also presents the study's conceptual framework, which builds on and reflects the theoretical and conceptual ideas developed above.

# Chapter 4: Methodology

## 4.1 Introduction

This chapter outlines the methodological design of the study. It begins by summarising the philosophical, theoretical and conceptual framing, as presented in the previous chapter, before detailing the methodological approach, data collection procedures and the data analysis strategies employed. Consideration is also given to issues of rigour and trustworthiness, as well as the ethical protocols that were followed throughout the study.

The overarching aim of this qualitative, longitudinal study was to explore students' relationships with mathematics across the transition from primary to post-primary school by examining their mathematical identities during this time. The research took place within the Irish education system and involved seventeen sixth-class students from five primary schools, who transitioned into ten different post-primary schools.

A small-scale pilot study was conducted in June 2021 with three students, which informed the methodological design of the main study. A summary of the pilot is included in Appendix A. The study was guided by the following research questions:

1. What is the nature of the mathematical transition students undertake as they move from primary to post-primary school?
2. What do students' mathematical identity journeys look like across the transition journey from primary to post-primary?
3. What factors influence students' mathematical identity during the transition from primary to post-primary school?

Of particular importance is the theoretical framing underpinning this study, as outlined in the previous chapter. This chapter demonstrates how the sociocultural perspective informed the study's methodology, ensuring a coherent and connected approach throughout.

## 4.2 Methodological approach

This section outlines the methodological framing that underpins the study. It builds on the theoretical and conceptual foundations presented in the previous chapters and shows how these inform the research design and methodological choices. The section begins by summarising the study's philosophical positioning and conceptual commitments, before discussing the influence of narrative and enactivist perspectives on the methodological design.

The section concludes by presenting the study's conceptual framework, which synthesises the theoretical insights and methodological orientation that have guided the study.

#### *4.2.1 Philosophical position*

The study was located within an interpretivist paradigm, which prioritised understanding the meanings individuals placed on their experiences. Knowledge was understood as co-constructed and shaped through dialogue and reflection. This view aligned with a subjectivist epistemology, recognising that knowledge is situated, personal and influenced by context. A relational ontology further informed the study's approach, positioning mathematical identity as something that emerges through connections with others, with institutions and with cultural tools such as language or mathematics itself.

These philosophical positions necessitated a methodology that could capture nuance, subjectivity and change over time. As researcher, I was particularly drawn to approaches that would allow me to engage deeply with students' voices and narratives and remain attentive to the social contexts that informed their experiences.

#### *4.2.2 Conceptual commitments*

The conceptual framing of this study was grounded in a sociocultural perspective of learning and identity. As discussed in the previous chapter, mathematical identity was understood as socially constructed, malleable and expressed through narrative. This framing positioned identity not as a fixed trait but as something negotiated over time through experiences, interactions and participation in various social and cultural practices. As previously highlighted, the "field of identity studies constitutes theoretical and methodological complexities" (Wetherell, 2010, p. 4). The study definition of mathematical identity sees it being depicted or represented in narrative form (Bishop, 2012). Acknowledging the fluid and ever-changing nature of mathematical identity, narratives can allow participants to share experiences or events that were particularly powerful in shaping their relationship with mathematics (Howard et al., 2019). This narrative framing aligned with the study's longitudinal design and the aim of tracing shifts in students' mathematical identities across the transition from primary to post-primary school.

The conceptual and philosophical foundations directly informed the methodological design of the study. Understanding mathematical identity as relational, malleable and narratively expressed necessitated an approach that could capture students' perspectives over time and in an in-depth way. A methodological approach grounded in narrative inquiry and

supported by an enactivist perspective was therefore adopted. This enabled the exploration of students' lived experiences through the stories they told about themselves and their relationships with mathematics. In developing the study design, I was particularly aware of the need to choose methods that aligned with these conceptual commitments. My goal was to create an opportunity for students to speak and to share what mattered to them, and to capture how they related to mathematics over time. The decision to conduct the study longitudinally reflected this commitment to understanding identity as something that is negotiated over time.

#### *4.2.3 A narrative-enactivist methodological approach*

The epistemological and ontological positions outlined earlier informed the decision to adopt a methodological approach that combined elements of narrative inquiry with enactivist influences. As outlined in the previous chapter, these perspectives were introduced as important conceptual lenses for understanding mathematical identity as dynamic and relational in nature. Their influence is carried forward here in the methodological design. This dual orientation supported an in-depth, context-sensitive investigation into how students made sense of their mathematical experiences over time.

Narrative inquiry offered a means of accessing identity through the stories students told about themselves. Often situated within the interpretivist paradigm, narrative inquiry is a "profoundly relational form of inquiry" that focuses "not only on the individuals' experiences but also on the social, cultural, and institutional narratives within which individuals' experiences are constituted, shaped, expressed, and enacted" (Clandinin & Rosiek, 2007, pp. 42–43). The narratives were understood not as fixed accounts of fact, but as dynamic, meaning-making constructions shaped by social context, emotion and interaction. Methodologically, this perspective informed the study's use of semi-structured interviews and Personal Journey Graphs (PJGs), both which will be detailed further in the next section, which encouraged students to reflect on key moments and articulate shifts in their relationship with mathematics. The study design was guided by a sensitivity to temporality and context, principles central to narrative research, and reflected a commitment to exploring identity as negotiated across time and place. Narrative inquiry brought many advantages in the context of this study. Research suggests that participants are generally willing to share their experiences through stories, often revealing deeply personal reflections in the process (Savin-Baden & Van Niekerk, 2007). This allowed for rich, in-depth engagement with students' evolving mathematical identities. However, Savin-Baden and Van Niekerk (2007) also point out that one of the challenges associated with using narrative inquiry is in "managing the story". By this the authors refer to how participants in the

narrative are represented and “spoken for” once the data are presented, emphasising the significance of my role as researcher. Attending to this challenge required ongoing reflexivity and a careful, ethical approach in how students’ narratives were interpreted, shared and later analysed.

Within the field of identity research, narrative inquiry appears as a useful methodological approach (e.g., Butina, 2010). With its emphasis on participants’ own narratives, it allows for a fuller understanding of identity development in particular contexts. Specific to mathematical identity, Glendenning (2020) applied a narrative inquiry approach in her work with pre-service teachers, exploring their journeys through initial teacher training, while Cheng (2016) investigated the trajectory of identity formation of university teachers. Both studies noted the richness of contributions afforded by narrative inquiry, particularly in tracing identity over time.

Forming an important pillar in the methodology of this study, enactivism placed significance on the relationship and interplay between the researcher and participants, with “the people, or the situation that he or she observes is fundamental and explicit; there is a bond between knower and knowing” (Maheux & Proulx, 2015, p.211). Enactivism challenges traditional representational views of knowledge, positioning knowing as a process that emerges through doing, being and interacting within the world (Varela et al., 1991). Knowledge is understood as actively co-constructed through engagement with the environment and with others, and this aligned closely with the study’s relational ontology and subjectivist epistemology. This orientation also influenced how I approached the role of the researcher. Enactivism challenges the notion of the researcher as a detached observer and instead foregrounds the co-constructed nature of knowledge. As I will describe below, interviews formed a central part of the methodology for this study. These were viewed as spaces of mutual engagement, where students’ narratives were shaped not only by their own histories and perspectives, but also by the relational dynamics of the research encounter. My own presence, the questions I asked and the responses I gave were part of the conditions under which identity was expressed.

Enactivism provided a useful lens for considering the multitude of factors that a student experiences across the transition from primary to post-primary school, as highlighted in Chapter 2. Engaging with the narratives of students can be understood, in enactivist terms, as an activity in which individuals enact a world of significance (Caracciolo, 2012). It is predominantly a participatory activity and, accordingly, the interpretation of such narratives can be conceived as an example of what enactivists describe as a “joint process of sensemaking.”

In bringing together the principles outlined, these methodological influences provided a coherent approach for exploring mathematical identity as a lived and contextually grounded process. They enabled a rich engagement with student voice while also foregrounding the dynamic, co-constructed nature of the research. This framing underpins the methods of data collection and analysis outlined in the following sections.

#### *4.2.4 Alternative approaches*

Alternative research approaches were also considered including a multiple case study approach. Multiple cases are used so that “individual case studies either (a) predict similar results (a literal replication) or (b) predict contrasting results but for anticipatable reasons (a theoretical replication)” (Yin, 2017, p. 55). However, given the exploratory nature of the study, as reflected in the research questions, this approach was not considered suitable. Adopting a narrative approach allowed for a deeper examination of how mathematical identity is experienced and expressed by students (Research Questions one and two). The in-depth nature of this approach provided insights into the factors, some of which may be personal to the students, and the impact these have on their mathematical identity (Research Question three). Finally, a narrative inquiry approach was particularly well suited to a longitudinal study of this nature, which sought to trace how students’ relationships with mathematics evolved, across the transition from primary to post-primary school.

#### *4.2.5 Conceptual framework*

The conceptual framework below synthesises the theoretical and methodological underpinnings of the study. It illustrates how mathematical identity, transition and identity negotiation are conceptualised and how these constructs inform the study’s methodological design. Building on the sociocultural and narrative-enactivist perspectives outlined in Chapters 3 and 4, the framework provides a visual representation of how the study explores students’ relationships with mathematics across the transition from primary to post-primary school.

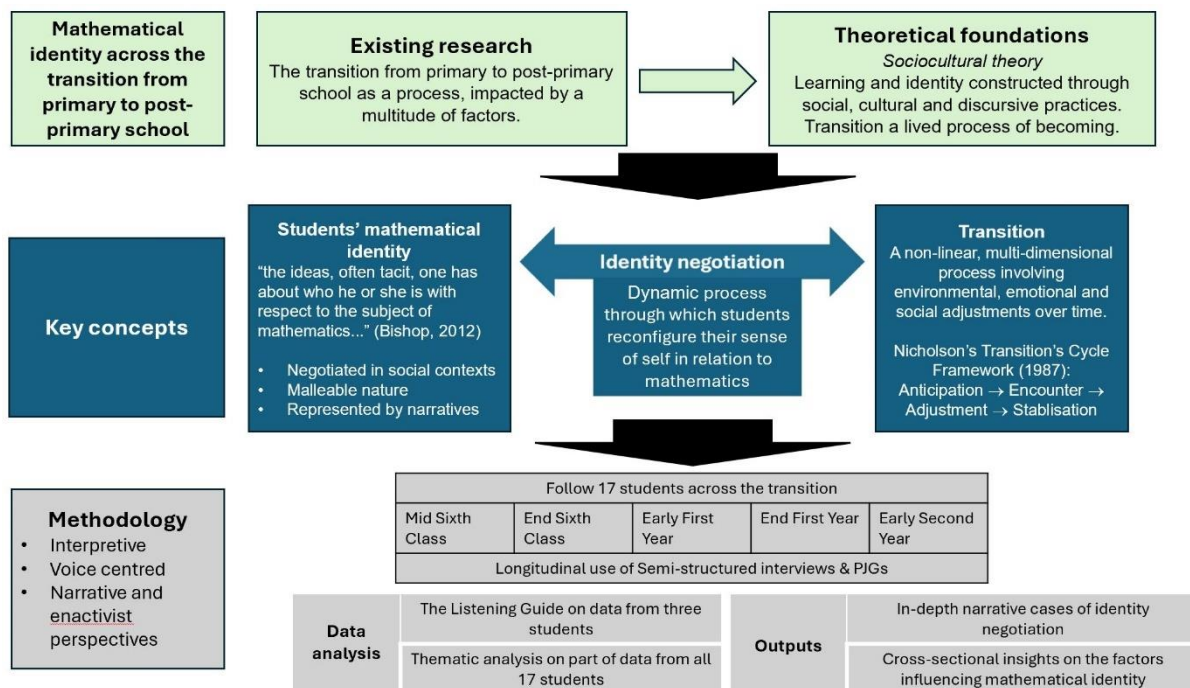


Figure 4.1: Conceptual framework for the study

#### 4.2.6 Summary

A qualitative research methodology was employed in this study, one that emphasised length, breadth and depth. Flowing from the research paradigm, the interpretive and inductive practices of qualitative research (Denzin & Lincoln, 2005) supported an exploration of students' relationships with mathematics across the transition. This study did not seek to measure change in predefined terms but aimed instead to listen closely to how students narrated and made sense of their experiences. The narrative-enactivist approach adopted in this study provided a methodological space in which students' voices, meanings and identities could be explored. Narratives enabled students to share experiences that were significant to them. An enactivist stance extended this by foregrounding how identity unfolds and is expressed within the interactional moment between the student and researcher. I was drawn to this approach for its openness, but also aware of the ethical and interpretive challenges it posed. Representing students' experiences responsibly required ongoing reflexivity and attention to the dynamics of power and voice, something that is explored further later in this section.

The transition from primary to post-primary school provided a unique context in which to examine these identity processes. This period of change created opportunities to explore how students narrated shifts in their relationships with mathematics and how they navigated new expectations and experiences. The conceptual framework thus provided a foundation for

understanding identity as situated and in motion, and it brought coherence to the methodological choices outlined throughout this section.

### 4.3 Data collection

Guskey (2009) proposes that how data is gathered is just as important as the data itself, asserting that data should be gathered in “meaningful and scientifically defensible ways” (p. 228). Situated in the interpretivist paradigm, the choice of the data collection methods was influenced by the central aims of the study, the participants involved and the conceptual understandings underpinning the central facets of the primary to post-primary transition and mathematical identity.

This section outlines how the study was carried out in practice, building on the methodological and conceptual framing outlined above. It describes the design and structure of the research, the processes of participant recruitment and engagement, and the tools used to capture data. A small-scale pilot study that informed the main study is also discussed. The section concludes with an overview of the timeline for data collection and a reflection on the role of the researcher throughout.

#### 4.3.1 Pilot study

With the main study longitudinal in nature, it was acknowledged that a significant commitment on the part of the participants was required. At the time, due to the COVID-19 pandemic, physical access to schools and participants was very difficult with alternative arrangements required. Therefore, it was deemed necessary to examine the feasibility of the research methods, recruitment and retention of participants, and the suitability of an online platform to mediate data collection for the study.

Ethical approval was granted for the study on May 31<sup>st</sup>, 2021 and a small-scale pilot was conducted between June and October, 2021. It involved two waves of data collection, with the use of semi-structured interviews and student drawings. The interviews took place using the Zoom platform. Three students participated in the pilot study, two boys and one girl. These students were recruited from a school known to the researcher. All three students were in Sixth Class at the time of joining the study and took part in two interviews, while also submitting drawings. Initial recruitment of participants did prove difficult, with a follow-up visit required by the researcher. It was felt that the time of year (June) did not help in this regard.

The pilot study provided important insights that informed the design of the main study. During the interviews, students were enthusiastic, engaged and demonstrated a strong capacity to share their views and stories. The key takeaways from the study included the following:

1. The recruitment process requires careful consideration. A number of primary schools need to be approached to ensure that the necessary number of students are recruited.

2. The semi-structured interviews were conducted via Zoom, with all students completing their interviews smoothly and without technical issues. However in some instances, students' responses to questions relating to their feelings about mathematics were limited. Based on the outcomes of these interviews, it became evident that the participants, considering their age, would benefit from the support of an additional data collection tool to help capture the students' evolving relationship with mathematics throughout the transition.

3. While the student drawings offered interesting insights into the students' views of mathematics, they in themselves were not as rich or as detailed as hoped. However, they served as a useful basis for discussion. Further findings from the pilot study are outlined in Appendix A.

#### ***4.3.2 Study participants***

While acknowledging the diverse demographic of students in Ireland, a representative sample of students was not prioritised, due to the focus and nature of this study. Given its longitudinal and qualitative nature, a small sample size was deemed appropriate, with 17 Sixth Class students recruited to take part. These students (10 girls and 7 boys) were drawn from five primary schools of different sizes located in urban, suburban and rural settings. While a key consideration was to capture a diverse range of experiences and perspectives, this diversity was not intended to enable comparison between groups. Having students from five primary schools, who went on to ten different post-primary schools, helped ensure that a single school's specific environmental, social, or cultural context did not overly influence the study. However, in keeping with the nature and aims of the study, variables including school type, socio-economic background and geographical variances could not be accounted for. Nonetheless, with the issue of gender arising in a number of instances across the literature explored, care was taken during recruitment to ensure a balance of girls and boys.

I approached five different primary schools to recruit participants. This involved initial contact with the school principal, followed by a formal letter to the Board of Management. Once permission was granted, documentation was sent to the schools for distribution among sixth-class students. This documentation included plain language statements for both students and

parents, a parental consent form and a student assent form (see Appendix C). To express interest in participating, parents were asked to make direct contact with me. Following this process, seventeen students were recruited. The profile of participating students is outlined in Table 4.1 below.

*Table 4.1: Details of participants*

<b>Student</b>	<b>Pseudonym</b>	<b>Gender</b>	<b>Primary school</b>	<b>Post-primary school</b>
1	Cian	Male	1	1
2	Ciarán	Male	2	2
3	Aine	Female	3	3
4	Aoife	Female	4	4
5	Cormac	Male	1	1
6	Finn	Male	2	5
7	Caoimhe	Female	4	6
8	Cara	Female	2	2
9	Clodagh	Female	4	7
10	Enya	Female	5	8
11	Gráinne	Female	5	8
12	Patrick	Male	5	8
13	Oisín	Male	4	9
14	Maeve	Female	5	8
15	Niamh	Female	5	8
16	Saoirse	Female	5	8
17	Seán	Male	3	10

#### **4.3.3 Data collection methods**

To reflect the fluid and malleable nature of mathematical identity, Larnell (2016) suggests that “broader snippets of experience” are more appropriate than fixed-response formats. Similarly, Darragh’s (2016) systematic review of identity research in mathematics education highlights identity as a complex and evolving concept that requires in-depth analysis of a small number of participants rather than generalisation from a larger group. The field is dominated by qualitative approaches such as interviews, written reflections and observations (Lutovac & Kaasila, 2019).

The use of autobiographical narratives has proven effective in exploring and reconstructing mathematical identity. Kaasila et al. (2006, p. 218) describe these narratives as including “the student’s personal experiences in learning and teaching mathematics and ways they managed them, important persons and explanations,” and collected data using a combination of questionnaires and interviews. Their work foregrounds storytelling as a key

method by which individuals share their experiences of mathematics and position themselves in relation to it.

**4.3.3.1 Semi-structured interviews.** A key consideration in this study was how to access mathematical identity in research terms, particularly with younger participants. Radovic et al. (2018) note that developmental stage and age can significantly shape how identity is experienced and expressed, particularly during adolescence. Drawing on Vygotskian theory, they emphasise that adolescence is a period of heightened self-awareness and increasing ability to articulate one's emotions and experiences through language. In this light, the use of interviews was deemed appropriate and developmentally sensitive.

Set within a narrative inquiry, the focus is on how participants make meaning of their world and how they relate to mathematics, while enactivism places a focus on participants' interactions with their surroundings. Thus, in line with the principles of narrative inquiry and enactivism, the interviews aimed to elicit participants' stories and descriptions of their interactions and experiences across the transition (Andrews et al., 2008). My role, as researcher and as listener, was to draw out stories through questions such as "how" and "what do you mean when you say...?" (Søndergaard, 1996). Of particular relevance, Hollway & Jefferson (2000) propose four principles for facilitating narrative interviews:

- Use open-ended questions (e.g. 'Tell me about your experiences of mathematics.')
- Elicit stories (e.g. 'What memories of learning mathematics do you have?')
- Avoid 'why' questions as these can encourage intellectualisation and can be threatening
- Follow up using the participants' ordering and phrasing (e.g. 'You said working in First Year was very complex, can you tell me some more about that?').

These principles informed the interview schedule used in the study. In addition, the questions were shaped by the study's conceptualisation of mathematical identity and the transition. With an emphasis on the socially negotiated nature of identity, a particular focus was placed on the students' experiences within the mathematics classroom. The questions schedule used for the first wave of interviews can be found in Appendix D. While a guiding structure was in place, the interviews remained open to change and development depending on the direction of the student's narrative (Savin-Baden & Van Nierkerk, 2007). In this context, my role as researcher extended beyond asking questions, it included creating space for stories to emerge and clarifying meaning where appropriate. Maintaining a reflexive stance was essential to ensuring the stories were interpreted responsibly and remained true to the students' intentions.

**4.4.3.2 Personal Journey Graphs.** Following the pilot study, it became clear that a different instrument was needed to support students in articulating their personal relationship with mathematics. As noted earlier, the student drawings used during the pilot did not yield data as rich or detailed as hoped. In response, a Personal Journey Graph (PJG) was introduced to provide a more structured and reflective tool. The graphs enabled students to trace changes in their relationship with mathematics over time and highlight key moments in their learning journey. They allowed for a further exploration of the impact of any experiences, as well as act as a useful source to revisit past experiences and expectations in later interviews. The PJG used in this study was adapted from Lewis's (2013) "Mathematical Life Story" instrument. Two PJGs were used (see Figure 4.2). The first one, used in the first interview, allowed participants to reflect on their historical relationship with mathematics across their time in primary education (completed graphs can be found in Appendix B). The second graph was used during each interview, serving as a graphical representation of how that relationship evolved through the transition into post-primary school. These graphs are further explored in section 5.1.

Such a tool allowed participants "to highlight significant experiences" along their journey (Ingram et al. 2018). Set within a narrative framework, Anderson (2005) used PJGs in a case study examining the implementation of a numeracy project with teachers in New Zealand. The graph was used to allow participants to reflect on their abilities in numeracy across a two-year period, indicating whether they felt they had low, medium or high implementation ability. Adapting Anderson's use of the graphs, Ingram (2011) used similar graphs with students in post-primary school, helping them share how their relationships with mathematics had changed over time. The author claimed that the graphs were very useful in allowing students to highlight significant experiences that impacted them along their journey, while also acting as a useful reflection point to see if events or experiences had longer term impacts on students. However, Ingram (2011) cautions that the views of participants about past experiences can change and what is reflected on the graphs is just what the participant feels in one particular moment.

	10								
	9								
	8								
	7								
	6								
	5								
	4								
	3								
	2								
	1								
	0	Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class

	10				
	9				
	8				
	7				
	6				
	5				
	4				
	3				
	2				
	1				
	0	Start of Sixth Class	End of Sixth Class	Start of First Year	End of First Year
					Start of Second Year

Figure 4.2: PJGS, as adapted from Lewis' (2013) *Mathematical Life Story Instrument*

In this study, PJGs were used alongside semi-structured interviews during all five waves of data collection. During the semi-structured interviews, students were invited to consider and rate their relationship with mathematics along a ten-point scale. The scale was supported by visual prompts in the form of facial expressions ranging from very negative to very positive, to help students interpret each point along the continuum. For example, in the third interview, as students had the first number of months of First Year completed, when introducing the PJG, I said: “We will return to the maths journey graph we completed the last day. This time, we’re focusing on the last two months in particular - so, the start of First Year. On a scale from 0 to 10,

how would you rate your overall relationship with maths across this time?” I encouraged them to think about specific times, mark a score for each point, and explain what had influenced that score. During the first wave, the graph focused on students’ life histories in mathematics across their eight years in primary school. In subsequent waves, the graph was adapted to focus specifically on the transition period and post-primary experiences. Students were asked to provide a numerical value indicating this relationship and were encouraged to explain their reasoning, identifying high significant points along their journey. In this way, the graphs offered a sensitive and flexible tool that captured students’ relationships with mathematics.

#### 4.4.4 Phases of data collection

Data were collected across five waves over a 20-month period, allowing students’ experiences across their transition from primary to post-primary to be traced. This longitudinal approach aligned with the conceptual framing of identity as relational and evolving, and allowed for the exploration of change, continuity and reflection over time.

Taking account of Nicholson’s Transitions Cycle framework (1987) as discussed in the previous chapter, the fourth phase, ‘Stabilisation’, was expected to occur by the end of First Year in post-primary. This study extended into the start of Second Year to explore whether, and to what extent, such stabilisation had occurred. Collecting data at this later stage also offered the opportunity to examine the longer-term impact of the transition and to better understand how students’ relationships with mathematics had settled or continued to evolve. An overview of the five phases is outlined in Table 4.2.

Table 4.2: Overview of schedule of data collection

Wave	Timing	Description
1	Second half of Sixth Class (March 2022)	Semi-structured interviews and PJGs
2	End of Sixth Class (June 2022)	Semi-structured interviews and PJGs
3	Beginning of First Year (October/ November 2022)	Semi-structured interviews and PJGs
4	End of First Year (April/May 2023)	Semi-structured interviews and PJGs
5	Start of Second Year (October/ November 2023)	Semi-structured interviews and PJGs

Each wave included a semi-structured interview and the completion or revision of the student's PJG. The regularity of contact helped build trust with the students, supporting the development of a safe space that allowed for meaningful engagement.

#### *4.4.5 My role as researcher*

In qualitative research, particularly within interpretivist and narrative traditions, the researcher is recognised as central to the research process. Rather than acting as a neutral observer, they are viewed as an active participant in meaning-making, shaping the conditions of the research encounter and the narratives that emerge within it (Hollway & Jefferson, 2000; Denzin & Lincoln, 2005). A researcher's positionality can impact not only how one approaches knowledge, but is also critical to the production and understanding of knowledge (Bettez, 2015). According to Bettez (2015), engaging in a period of self-reflection is an important step before articulating one's positionality. In this vein, Hertz (1997) views reflexivity as a focus on "what I know" and "how I know it". When reflexive, researchers are attentive to how their experiences, knowledge and social positions may impact each aspect of the research process.

Since 2017, I have been working with the NCCA, a statutory body responsible for curriculum and assessment development across early years, primary and post-primary education in Ireland. In this role, I contributed to the development of the new Primary Mathematics Curriculum (DE, 2023a), collaborating with schools, professional development bodies, initial teacher education providers and other stakeholders to design a curriculum for all learners in primary and special schools. My previous eight years' experience as a teacher, combined with this role in NCCA, has offered me insights into, not only curriculum and policy imperatives at national level, but also into what is fundamentally important for student's learning in mathematics. It has influenced my values and beliefs, bringing to the fore the importance of and place of research within mathematics education; foregrounding the voice of students; the significant role of pedagogy and practice within mathematics education; and ensuring mathematics is presented and viewed as a worthwhile, accessible endeavour for all. The research topic is of particular interest to me. Having directly taught Sixth Class students for a number of years, I sought to always instil in the students a wonder and positivity towards mathematics. As they prepared to make the transition journey to post-primary school, I often wondered what impact this journey and subsequent learning experiences would have on their mathematics learning and also on their relationship with the subject.

In this study, the researcher-participant relationship was understood as open and responsive, consistent with the enactivist view of knowledge as relationally and contextually

constructed (Maheux & Proulx, 2015). Given the longitudinal nature of the research, my presence played a significant part in the data collection process. Over time, my relationships with the students deepened, helping to build trust. This trust often encouraged more open sharing, but also required me to remain aware of how my presence might shape the stories students chose to tell, both within and across interviews. Additionally, in line with Clandinin and Connelly's (2000) framing of narrative inquiry as a "relational form of inquiry," I remained attentive to the emotional tone, pace and comfort level of each student. I also took care to create an interview space in which students felt safe and heard. Drawing on Lundy's (2012) model of participation, I prioritised students' right to express their views, to feel heard and to know that their perspectives were taken seriously. Throughout the process, my goal was to create research spaces in which students could speak in ways that felt authentic to them.

My role during interviews was shaped by narrative interviewing principles (Hollway & Jefferson, 2000), which required me to follow the student's lead, avoid overly directive questioning and remain attuned to the language and tone of their narratives. I was also mindful of instances when students chose not to elaborate or when their narratives moved into unexpected directions. In this sense, the interviews were not neutral data collection events, but relational spaces where identity was narrated and, to some degree, enacted in response to my presence, questions and responses.

Reflexivity was an ongoing component of the research process. I maintained reflective notes after each interview, recording my impressions, emerging assumptions and any questions or wonderings I had. This helped me remain aware of how my own perspectives, biases and interactions may have shaped the stories told (Berger, 2015). Additionally, a level of reflexivity was embedded within the analytic process itself through the use of the Listening Guide, an approach that will be discussed in the following section.

## 4.5 Data analysis

This section outlines the analytic approach taken in this study, which combined two complementary strategies to address the research questions and to reflect the study's conceptual framing.

Unsurprisingly, qualitative analysis methods dominate research in the field of mathematical identity. Common approaches include discourse or conversation analysis (e.g., Bishop, 2012) and thematic analysis (e.g., Andersson et al., 2015). The use of thematic analysis within the area has been critiqued as sometimes overly vague in terms of the steps used to

analyse a data set (Hall et al., 2018). Indeed, thematic analysis can “on the one hand wrangle, condense, and organize qualitative data, but on the other, can flatten, laminate and circumscribe the more dynamic aspects of people’s narratives and narration” (Tolman & Head, 2021, p.153). In remaining true to the aims of this study, I wanted an analysis that would reveal the dynamic and intricate layers of students’ mathematical identities as they experience the transition journey.

A key idea within enactivism is the use of multiple perspectives (Reid, 1996). Such use is not for the purpose of validating results or theories, instead it allows the researcher to observe more or “widen the domain of possibilities” (Reid & Mgombelo, 2015). This involves the examination and re-examination of data. Within the narrative-enactivist approach, the foregrounding of participants’ voices and experiences is paramount. Combined with the definition and qualities of mathematical identity situated within a sociocultural framework, as discussed in the previous chapter, this compelled me to seek an analysis that would unearth the complexities of mathematical identity while also accounting for the wider context.

At the core of this analysis were the interviews conducted with students, with their narratives seen as the basis for the analysis process. In focusing on the identity journeys of the students, my role as researcher was to interpret the stories shared by them in order to uncover the underlying narrative that they may not be able to give voice to themselves (Riley & Hawe, 2004). Given the complex, fluid and socially situated nature of mathematical identity, and the longitudinal structure of the data, a single method of analysis was unlikely to capture its multiple layers. Instead, the following dual analytic approach was adopted:

- A narrative-relational analysis using the Listening Guide (Gilligan et al., 2003) was applied to a subset of three students, allowing for a deep exploration of their individual identity journeys across the transition.
- A thematic analysis of narratives (Polkinghorne, 1995) was used to examine data from all seventeen students, with a specific focus on students’ reflections around their PJGs.

Each analytic strand is described in the following subsections.

#### *4.5.1 The Listening Guide*

Situated within the narrative space sits a unique, voice-centred relational method of analysis known as the Listening Guide. This method was developed from Gilligan's (1982) early work on identity and moral development, and later expanded by Gilligan and colleagues (Brown & Gilligan, 1992; Gilligan et al., 2003). Also referred to as the voice-centred relational method, it

is grounded in feminist educational psychology and has been used to amplify the voices of those often marginalised or unheard. This approach aligns with the study's aim of giving students a platform to share their experiences. Originating from a method of interviewing, the approach draws on "voice, resonance, and relationship as ports of entry into the human psyche" (Gilligan et al., 2003, p. 157). According to Mauthner and Doucet (1998, p. 9), this voice-centred relational approach explores "individuals' narrative accounts in terms of their relationships to themselves, their relationships to the people around them, and their relationships to the broader social, structural and cultural contexts within which they live". In this way, humans are seen to be situated within a complex web of different social relations and structures, very much mirroring the transition process from the perspective of students, as discussed previously.

A core principle of the Listening Guide is that identity is both relational and dynamic, consistently engaging with social, material and cultural contexts (Gilligan et al., 1992). These contexts are accessed through participants' personal narratives, which serve as an entry point into their lived experiences. Gilligan (2015) highlights the association of the word "method" with "way", describing the Listening Guide as a way of listening attuned to the layered and often contradictory communication of individuals. Voice and silence are both seen as universal human traits and central in this method, allowing researchers to discern not only what is said, but also how it is said, and what remains unsaid (Woodcock, 2016). In this way, the Listening Guide enables attention to tone and the emotional landscape of voices, offering insight into what participants may know or feel, but have yet to fully construct (Gilligan, 2015).

As aforementioned, the Listening Guide is rooted in feminist educational psychology, which emphasises voice, relationality and context in understanding human experience (Brown & Gilligan, 1992; Mauthner & Doucet, 1998). This feminist stance informed the use of this method, aligning with the commitment of the study to attend to voices of students, ensuring their lived experiences of the transition are the heartbeat of this research. Rather than seeking neat or universal truths, the method embraces complexity and contradiction within students' narratives, resonating with broader feminist principles of inclusivity and the interrogation of power dynamics (Fine, 1992). In this way, the feminist orientation of the Listening Guide supported the study's goal of making visible the lived and situated nature of students' voices.

The Listening Guide is particularly appropriate for a focus on participants' understandings and navigations within cultural and social contexts (Jankowska, 2014; Tolman & Head, 2021). Furthermore, this method reflects a relational ontology, centering importance around the role of relationships with others and the surrounding environment (Mauthner &

Doucet, 1998), as well as recognising my active involvement in identifying and interpreting voices within statements. Such an orientation is keeping with the overall theoretical framing for this study and the research paradigm as outlined earlier.

**4.5.1.1 The Listening Guide in context.** The Listening Guide method has been used across a variety of fields, such as gender studies (Tolman, 2002), females in the workplace (Balan, 2005), professional identity (Joseph et al., 2017) and education (Woodcock & Hakeem, 2015; Raider-Roth, 2005). The use of the Listening Guide method in the field of mathematical identity is uncommon. However, its presence in two relatively recent studies in the area shed light on its usefulness and appropriateness (Hall et al., 2018; Simpson, 2015).

As highlighted by Hall and colleagues (2018), very few studies have offered solutions to “hear” the identities of participants. Using autobiographical interview data collected from students at primary level, they utilised the Listening Guide to explore the mathematical identity of participants. They noted that the method proved particularly effective, describing it as a “nuanced technique that allows the complexity of students’ mathematical identities to be drawn out” (Hall et al., p. 182). The method also answers a call from Schütze (2009, p.153) to become sensitised to the “epistemic power of autobiographical storytelling to reveal biographical and social processes” in the analysis of identity development. Hall et al. (2018) further highlight the method’s value in tracing the fluid and contextually situated nature of mathematical identity, a key theoretical underpinning of my study. The fluidity of mathematical identity can be seen in the multiple views or voices that can sometimes change, as a student negotiates different experiences with their surroundings and with others.

As the basis of their doctoral work, Simpson (2015) explored the mathematical identity of students within single-sex and co-educational classrooms. Based within a narrative inquiry approach, the study uses the Listening Guide, describing it as an adaptable method used to glean insights into the interviews and observations conducted. Grounded in the work of Gilligan (1982), Simpson puts emphasis on the multitude of “voices” at play shaping one’s mathematical identity.

For my study, the Listening Guide offered a powerful means of foregrounding the voice of students, while also enabling a rich exploration of how mathematical identity is negotiated across the transition. In addressing the research questions, a deep, relational analysis was required. The Listening Guide offered a structure that could attend to the personal, interpersonal and sociocultural dimensions of identity as they unfolded in students’ narratives.

**4.5.1.2 A selection of students.** To enable a deep, layered exploration of students' mathematical identity journeys, the Listening Guide was applied to a subset of three students. These three were selected purposively to reflect distinct identity trajectories as illustrated in their PJGs, and presented in the next chapter. Additionally, to reflect a balance of school origin, I ensured that the three students chosen originated from different primary schools. This sampling approach was guided by the narrative-relational purpose of the analysis, to explore how mathematical identity was enacted and negotiated across diverse schooling and transitional experiences.

Eighty-five interviews were recorded and transcribed with the support of the transcription software, Otter (Otter ai®, Mountain View, CA, USA). The decision to transcribe the interviews myself, rather than send to an external, third party service, allowed me to begin forming a relationship with the data shared by students, something emphasised within the Listening Guide.

**4.5.1.3 Using the Listening Guide.** The Listening Guide is composed of four sequential "listenings," each of which provides a distinct lens through which to engage with participants' narratives. The term "listening" is used deliberately to underscore the active, relational process of meaning-making between researcher and participant (Gilligan et al., 2003). Each step is designed to uncover different dimensions of identity by tuning into voice, tone, emotions and contradictions. The method required a commitment to deep, repeated engagement with the data. This section outlines how each listening was applied in this study, including the rationale and procedures used to analyse the interview transcripts.

***First Listening: Listening for the plot and the researcher's response.*** In the first step of the Listening Guide, the researcher listens for the plot within a participant's narrative, as well as reflecting on their own response to the interview. The initial reading or listening is a common early step in many forms of analysis and is used to take account of the whole story being told (Brown & Gilligan, 1992). Here, the researcher is gaining an understanding of what is occurring or unfolding, "the who, what, when, why and where" of the narrated experience (Brown & Gilligan, 1992, p. 15). This process includes keeping track of the "trail of recurring words, events, protagonists, the central plot, subplots and key characters within individual transcripts" (Hutton & Lystor, 2021, p.21). This also includes listening for silences within each interview. As Woodcock (2016, p.3) notes, research in the field of education can, at times, put emphasis on voice and silence as "they are both deeply embedded in the intricacies of confusion, resistance, ideology, and knowledge". These can include pauses, lowered voices and trailing off mid-

conversation (Woodcock, 2016). As part of the analysis, such silences were noted and any related evidence to explain why.

To support the organisation of ideas emerging from this first listening, I adopted a colour-coded system, as recommended by Woodcock (2016), and began creating a master list of themes that could later support cross-participant analysis, if required. In line with the aims of this study to centre students' voices, individual narratives were analysed first before any attempt was made to group themes across cases (Riessman, 2008). A sample section from a transcription can be found in Appendix F.

As Gilligan and Eddy (2021) note, there is no such thing as “pure” listening. Listeners “bring preconceptions and experiences that shape what we can and cannot, will and will not hear, as well as what someone might or might not be willing or able to say in our presence” (p. 142). From my perspective as a researcher, this listening also provided a space to reflect on and document my responses to both the participant and their story (Brown & Gilligan, 1992). Reflexive in nature, this listening involved tracking my own reactions to, feelings and thoughts on the student and the narratives they shared. For this step, Brown and Gilligan (1992) suggest the use of a two-column format in which responses are in one column and the researcher’s reactions and interpretations are adjacently aligned in another column. This process of reacting to participants’ narrative by tracking my own thoughts is consistent with the enactivist view that knowledge and understanding are co-created through interaction. By engaging with the data and reflecting on my own reactions, I am participating in a dynamic, embodied cognitive process. The purpose of this step is not to allow my own interpretations of my initial listening to interfere with the analysis process (Mauthner & Doucet, 2003). These were compiled as comments to the transcripts (see Appendix G).

**Second Listening: “I” Poems.** Referred to as “listening for I-ness”, the second step involved me listening for the student’s voice of the self. The goal is for the researcher to hear how a participant talks about themselves and to examine relationships and note repetitions in terms of self (Gilligan et al., 2003).

In this step, I specifically listened for the “I”, the first person voice used by students as they spoke of themselves. Of note, individuals may consciously or unconsciously distance themselves from a specific statement by opting for the pronoun “you” instead of “I” (Woodcock, 2016). This choice in pronouns can impact how personal or detached the speaker appears in relation to the statement made, with the interplay between sometimes revealing something meaningful. For this reason, Woodcock advises researchers to “be sensitive to ‘you’ statements

and possible interpretations of them, especially considering the institutional restraints and cultural norms that potentially silence voices or constrain expression” (Woodcock, 2016, p. 5).

Similarly, in their discussion of I poems in qualitative longitudinal interview data, Edwards and Weller (2012) propose that focusing on references to “you” and “me” is equally insightful in exploring a sense of self. Indeed, in her study involving senior college students, Diamond (2021) emphasised the usefulness of exploring the interplay between “I” and other pronouns such as “you,” “we” and “they.” As identified by Jack (cited in Diamond, 2021), the presence of an “over-eye voice” speaks to the “I” but in the third person, using words like “you” or “one.” This voice employs a third-person tone that can appear “moralistic, objective” and “judgemental” often “relentlessly condemn[ing] the authentic self” (Diamond, 2021, p. 266). Diamond also identifies an “idolised you voice” as something associated with the expectations or perceptions of others, while also revealing “parts of the identity that were idealized and might only be achieved in the future” (Diamond, 2021, p. 272). Interestingly, the same author also noted that this voice, when used by participants, was usually done so in negative terms, portraying elements of “fear, anxiety and confusion”.

From this step emerge the I poems. These outputs offer a way to attend to a participant’s first-person voice and to “pick up an associative stream that flows through the narrative, running underneath the structure of the sentences” (Gilligan, 2015, p. 72). This “stream of consciousness carried in the first-person voice” can reveal ideas not explicitly stated by the participant but nonetheless central to their meaning-making (Woodcock, 2016). Also noted by Gilligan (2015), this step represents a deliberate shift from conventional approaches to analysis and marks a critical moment where the researcher enters into a relationship with the participant. This step can also help track the movement and tension within the “I” voice, for example, whether confident statements (e.g., *I know*) are followed by statements of doubt (e.g., *I don’t know*).

The development of I poems involved locating and listing all “I”, “me”, “you”, “we”, “they”, “them” and “our” statements, along with the verb and any accompanying illustrative text. Extraneous words or filler text were excluded in order to keep the focus on the participant’s own phrasing. To exemplify the development of I poems, below is an excerpt taken from the third interview with Caoimhe (see Figure 4.3).

Caoimhe: "Well we're on integers now but it's actually not that bad because the last two chapters we did was sets and natural numbers. I found sets and natural numbers easy, but then when we got to integers, they're a little bit harder but I'll get them and I'm not like struggling with them, but they're just a little bit harder."

Interviewer: "Okay and that level of easy or hard, how would you compare that to what you did in primary school?"

Caoimhe: "Um, like, we never did the dividing of like in brackets and things so that was a bit confusing but, like, once we saw the rules we kind of got it. Also, we didn't do sets in primary school but like once you got the hang of it like, it was kind of easy but like it just took a while."

Interviewer: "Okay and how did that all make you feel towards maths then inside? What kind of things are going through your head about maths?"

Caoimhe: "At the start I didn't want to do it, like maths was a bit, like, boring and I didn't want to go in but then once, like, we got past sets and natural numbers and things, and we got into, like, all the work, then we got used to we weren't too bad, like, and we didn't really mind going in then."

Figure 4.3: Interview excerpt taken from Caoimhe's third interview

The statements from the transcript were sequentially arranged, in order of appearance, with one phrase listed per line. These lines were then organised into stanzas, where appropriate, to reflect a break in the dialogue, similar to that of traditional poems. The output is presented below as an example of an I poem used in the analysis process (see Figure 4.4).

<p>I found sets easy</p> <p>I'll get them I'm not like struggling</p> <p>I didn't want to do it I didn't want to go in</p>	<p>You got the hang of it</p>	<p>We're on integers now We did</p> <p>They're a little bit harder</p> <p>They're just a little harder</p> <p>We never did We saw the rules We kind of got it We didn't do</p> <p>We got past We got into We got used to We weren't too bad We didn't really mind</p>
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Figure 4.4: Sample I poem developed from the excerpt above in Figure 4.3

While the logic within the poems is not necessarily linear or follows in a one-way stream, Gilligan (2015, p. 72) emphasises that they do have "an associative logic, and listening to the I in this way can evoke a voice that is speaking under a surface of dissociation: an I who knows, and yet may not consciously know what it knows".

**Third Listening: Listening for contrapuntal voices.** The penultimate step focused on listening for contrapuntal voices. Such voices show that "although they are not necessarily

opposites, the two voices are strongly differentiated and embody different perspectives” (Sorsoli & Tolman, 2008, p. 498). Contrapuntal voices can run in conflict with each other, with the participant themselves, with the voice of another, or with the voices inherent in one’s community (Gilligan et al., 2003). In essence, each voice presents a different way in which the participant discusses their experiences, with the onus on the researcher to examine the relationships between or among the voices.

This step required me to return to the interview data at least two more times, each time listening with a focus on identifying at least two contrapuntal voices present in the narratives. The initial two steps already established the overall plot and context, and the participant’s voice of self, which were then used to begin to identify voices in the narrative. For each voice identified, I compiled a brief description to determine whether it offered meaningful insight and was useful in addressing the research questions.

In practical terms, I colour-coded and highlighted sections of the transcript to represent each voice, creating a visual map of the directions of voices within the narrative. The multiple readings allowed me to attribute different parts of the interview to each voice. In each reading, I focused on identifying sections of the transcript that align with each voice. Likening this step to musical aspects of listening, Gilligan (2015, p. 72) notes that listening for contrapuntal voices can pick up “the tensions, the harmonies and dissonances between different voices” and allows the researcher to “hear complexity rather than flatten the data”.

**Synthesising insights.** The final step involved drawing together the insights generated across the previous three steps to develop a more holistic understanding of each participant’s experience. With each listening offering a distinct layer of interpretation, this step weaved these threads together to illuminate the complexity and multiplicity of voices that shape a participant’s narrative (Gilligan et al., 2003). As Chandler (2023) reminds us, none of the “listeenings” are intended to stand alone and only together can they represent an individual’s full experience. Savin-Baden and Van Nierkerk (2007) recount that in their analysis and subsequent sharing of analysis, one of the strategies used was to share a personal summary of each participant and their story. This involves locating the person in a context, describing how they see themselves. The authors propose that composing such biographical accounts supports the interpretation of the data by keeping the focus on an individual in context. Indeed, the Listening Guide provided me with an opportunity to build such a summary of the participants and also to complete an analysis across individual narratives in seeking to answer the research questions.

This synthesis fed directly into addressing the study's first two research questions, particularly in terms of how mathematical identity was experienced across the transition. It was not only about identifying what participants said, but understanding how their sense of self in relation to mathematics was negotiated through different voices, events and interactions. While the Listening Guide supported close, relational analysis of individual narratives, a broader lens was needed to explore patterns across the full data set. This next phase of analysis focused on identifying common themes in students' reflections, particularly those connected to their PJGs.

#### *4.5.2 Thematic analysis of narratives*

The second strand of analysis focused on identifying patterns across data from all students, with particular attention to how they reflected on their PJGs. This phase adopted a paradigmatic approach to narrative analysis, sometimes referred to as an "analysis of narratives" (Polkinghorne, 1995), involving the classification of recurring ideas, experiences and themes across students' narratives. In describing the notion, Polkinghorne (1985, p. 9) states "The primary operation of paradigmatic cognition is classifying a particular instance as belonging to a category or concept", claiming such a process brings order to experiences. This second strand of analysis provided a way of identifying themes that cut across students' accounts and addressed the third research question.

In undertaking analysis of narratives, two possible approaches exist; inductive or deductive (Sharp et al., 2019). The inductive analysis approach involves deriving themes and categories directly from the data, while the deductive analysis of narratives focuses on analysing data with pre-determined knowledge or concepts in mind. As noted by Berg (2007), the inductive process allows for a more direct representation of the experiences of participants, with findings grounded within the data. In his description of this method of analysis, Polkinghorne (1995, p. 10) describes a process of analysis in which the researcher searches for "common themes or ideas" using a coding process. The researcher then separates "the data into groups of like items", with "categories being revised and tested", before the relationships "between and among the established categories" are explored. Such descriptions are commonly associated with grounded theory (Glaser & Strauss, 1967) or thematic analysis (Braun & Clarke, 2006). Indeed, Kim (2016) simplifies the method by claiming that findings should be arranged around the "description of themes" that are common across the narratives collected.

While a key strength of the analysis of narratives approach is in how "general knowledge" can be developed from a collection of stories or narratives, Polkinghorne (1985, p. 15) also cautions that such an approach is "abstract and formal, and by necessity underplays the

unique and particular aspects of each story”. Similarly, Oliver (1998, p. 250) cautions that such a method, while useful in identifying common themes across the data, often misses the “uniqueness of each story”, with personal experiences often generalised to fit particular themes or codes. While mindful of this limitation, I was satisfied that the dual approach to analysis that makes use of the Listening Guide ensured the unique voices and experiences of students were brought to the fore.

An inductive approach was adopted, enabling themes to emerge from the data itself rather than being imposed in advance. In line with grounded theory principles (Glaser & Strauss, 1967) and Braun and Clarke’s (2006) six-step model, this involved a careful process of reading, coding and categorising. Data was uploaded to NVivo software to help manage the coding and theming process. Part of the narratives of all 17 students were analysed in order to provide a comprehensive understanding of the diverse experiences and perspectives. By incorporating the voices of all students, the analysis aimed to capture the various external and internal factors that contribute to the shaping of their mathematical identity. For this analysis, I specifically focused on the sections of the interviews where students reflected on their PJGs. These graphs, completed during each interview allowed, the students to reflect on their experiences and relationship with mathematics, and provide a score rating between zero and ten. Each time students completed their PJG, they were asked to explain and justify the reasoning behind their score. This reflection and discussion formed the core of the narrative data used for this part of the analysis. The decision to focus on these sections was guided by the need to explore how students’ mathematical identity was seen to be influenced, in keeping with the third research question. The PJGs provided a structured and reflective opportunity where the students engaged in self-reflection while discussing their experiences. This decision was also taken for practical reasons, given the scale of the data set.

**4.5.2.1 Thematic analysis.** An analysis of parts of all narratives gathered from the semi-structured interviews was conducted. As discussed above, this involved analysing the narratives in order to identify key themes or categories. To structure this process, I adopted Braun and Clarke’s (2006) six-step approach to thematic analysis. This framework offers a “systematic” and “sophisticated” approach that has been widely used across various types of qualitative research (Howitt & Cramer, 2008). The process was inductive and interpretive in nature, while remaining grounded in the data. The six steps, along with how they were applied in this study, are outlined below.

**Step 1: Become familiar with the data.** A common first step in many analysis methods associated with qualitative research, this involved me immersing myself in the data. I read and re-read the specific part of all 85 interview transcripts and examined the accompanying PJGs. During one reading, I also listened to the recording of the interviews, noting any important emphasises by the students. Initial impressions and points of interest were noted for each one, forming the foundation for later coding.

**Step 2: Generate initial codes.** In this step, the data was organised systematically into meaningful segments. As Clarke and Braun (2013) remind, coding “is not simply a method of data reduction, it is also an analytic process, so codes capture both a semantic and conceptual reading of the data” (p. 121). Codes, or labels, were applied to excerpts of data that conveyed important insights, often resembling the open coding phase in grounded theory (Clarke & Braun, 2014). As discussed, the data gathered was transcribed and uploaded to NVivo software as a method to assist the coding process.

**Step 3: Search for themes.** The third step involved reviewing the codes to identify patterns and relationships. A theme is understood to be “a coherent and meaningful pattern in the data relevant to the research question” (Clarke & Braun, 2013, p. 121). In constructing themes, there is no “hard and fast” way to complete this step, with the researcher asked to actively search through the codes to look for patterns and prominent aspects of the data (Braun & Clarke, 2006). Importantly, this process is underpinned by meaning making, as opposed to simply relying on the quantitative appearance of certain codes. I examined all codes from Step 2 and began grouping those with conceptual similarity. Emerging themes were then collated, ensuring they remained closely tied to the research question.

**Step 4: Review themes.** This step required the refinement of preliminary themes. Here, I asked if the original themes made sense, checking if they “work” on two fronts (Clarke & Braun, 2014). Firstly, did they work in relation to the coded data, in terms of representing and capturing the important features of the codes. Secondly, if the themes worked in relation to the entire dataset selected for analysis. In this way, I reflected on whether the original themes told a story about the data. Pulling together all the data associated with a theme is an important phase in this step. Some themes were merged or redefined, while others were split or discarded as needed. Finally, within this step, I started to think about how the nature of each theme could be defined, and the relationship between the themes (Braun & Clarke, 2006).

**Step 5: Define themes.** The penultimate step involved developing detailed descriptions of each theme which aim to “identify the ‘essence’ of what each theme is about.” (Braun &

Clarke, 2006, p.92). Data extracts that would later be used in the write-up were identified to support each theme. Importantly, the connections between themes were also examined to build a coherent analytic narrative. As Clarke and Braun (2014) note, this stage should “go beyond simply summarising or paraphrasing the data, to tell a rich, nuanced, conceptually informed interpretative story about the meanings embedded in and beyond the surface of the data” (Clarke & Braun, 2014, p. 121). The final part of this step involved naming each theme.

**Step 6: Write-up.** The final step of thematic analysis is the write-up, which Clarke and Braun (2014) describe as an integral part of the analytic process itself. In writing, I sought to consolidate the narrative of the data, refining interpretations and drawing the reader into the lived experiences of the students, ensuring that their voices remained foregrounded and that themes were clearly linked to the broader research question.

## 4.6 Methodological rigour

Establishing methodological rigour in qualitative research involves transparent, thoughtful and ethically grounded practices that enhance the trustworthiness of the study (Lincoln & Guba, 1985). In narrative and interpretivist traditions, rigour is achieved through sustained engagement with participants and careful reflection on the role of the researcher throughout. Following Lincoln and Guba’s (1985) criteria, this section outlines how credibility, transferability, dependability and confirmability were addressed during the research process.

### 4.6.1 Credibility

The credibility or internal validity of research refers to “the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account” (Strauss & Corbin, 1998, p. 137). In this study, credibility was enhanced through several strategies designed to ensure that students’ narratives were understood and represented as faithfully as possible.

Prolonged engagement with students contributed to the development of trust and rapport over time. This was particularly important given the age of the students and the longitudinal nature of the study. Contact across five interview waves supported a more open sharing of experiences, while allowing me to revisit previous conversations and clarify meaning as narratives evolved. Additionally, the iterative nature of data collection and analysis supported a deepening understanding of students’ experiences. For example, later interviews were shaped in part by earlier insights, allowing for an exploration of particular turning points or experiences deemed significant. This recursive process helped to surface both consistency and change over time.

The data analysis process itself also contributed to credibility. The Listening Guide was used to focus on what students shared, emphasising their voices and narratives rather than confirming any preconceived ideas. This approach aligns with Hutton and Lystor's (2021, p. 20) assertion that the Listening Guide helps foreground participants' stories, rather than solely reinforcing what the researcher may already expect. Finally, researcher reflexivity played a critical role in enhancing credibility. As outlined earlier, I maintained reflexive notes throughout the research process, especially after interviews. These notes enabled me to remain attentive to my own biases, expectations, and emotional responses, and to account for how these might shape the interpretation of students' stories.

#### ***4.6.2 Transferability***

Transferability, or external validity, refers to the extent to which the findings of the research can be generalised or transferred to other contexts (Lincoln & Guba, 1985). In qualitative research, the goal is to offer insights that can be applied to other situations with similar characteristics or dynamics, as opposed to produce findings that are universally generalisable. By providing some basic contextual information on the students in this study, it enhances the potential for transferability.

In this study, sharing contextual information about the students and the educational setting supports the potential for transferability. While the findings are firmly situated within the Irish context, the longitudinal design and working with students over an extended period offers a nuanced portrayal of how mathematical identity evolves across the transition from primary to post-primary school. This temporal depth strengthens the capacity of the study to offer insights that may be relevant or adaptable in other educational systems undergoing similar transitions. Additionally, the student-centred methodological approach, particularly the use of semi-structured interviews and PJGs, may hold value for researchers seeking to explore student's mathematical identity in other educational contexts. The attention to both individual and thematic patterns further enhances the potential for transferability, by offering layered understandings that extend beyond isolated cases.

#### ***4.6.3 Dependability***

Dependability, also referred to as reliability, concerns the extent to which the findings of research can be replicated or remain consistent under similar conditions (Merriam, 1998). In qualitative research, this does not mean producing identical findings due to the dynamic and contextual nature of human experiences. However, it does emphasise the need for transparency and consistency in the research process (Lincoln & Guba, 1985). In this study, attention was

given to maintaining transparency and coherence throughout the research design, data collection and analysis.

Documentation of my own reflections were captured through notes and annotations across the data gathering and analysis process. These records helped me to track my own thinking and provided a structured basis for interpreting students' narratives. The use of NVivo software further supported consistency in the coding and organisation of some of the data. In addition, the study's use of the Listening Guide (Gilligan et al., 2003) and Braun and Clarke's (2006) thematic analysis supported consistency in the approach taken. These established analytic frameworks provided a detailed approach to analysis that was applied systematically throughout.

#### ***4.6.4 Confirmability***

Confirmability refers to the degree to which the findings of a study are shaped by the participants' responses and are free from researcher bias (Lincoln & Guba, 1985). In qualitative research, where the researcher plays a significant role in data interpretation, it is crucial to demonstrate that the findings are shaped by the data and not by personal biases or motivations.

Reflexivity is a key component of confirmability. Throughout this research, I maintained an ongoing reflective process, examining how my own position as a researcher and my preconceptions may influence the data interpretation. Reflexivity was also built directly into the data analysis process. The first step of the Listening Guide required me to document my own responses to each student's narratives. This involved noting any emotional reactions, assumptions, questions or wonderings that I had during the listening. A summary of each reflection was created and sits alongside the other outputs of the analysis process. These explicit reflections, along with the multiple listenings shows how the Listening Guide supports a more transparent and reflexive analytical process (Gilligan et al., 2003).

### **4.7 Ethical considerations**

Given the qualitative nature of this study, which involved repeated interactions with young participants via the Zoom platform, a number of ethical considerations required careful planning prior to data collection. Ethical approval for the study (see Appendix E) was granted by the Dublin City University Research Ethics Committee on March 14th, 2022. As previously outlined, permission was obtained from school management and informed consent was secured from parents. For the students themselves, their assent was gathered. Throughout the data

collection, I ensured the students were fully informed of the study's aims and that their participation remained entirely voluntary.

#### ***4.7.1 Working with young people***

Given the ages of students in this study (11–14 years old), a number of measures were taken to ensure appropriate engagement. As mentioned earlier and found in Appendix C, a plain language statement was developed for parents and for the students themselves. Within this document, age-appropriate information was provided in relation to the study. Importantly, it was highlighted that participation in the study was voluntary and students had the right to withdraw at any stage during the process.

Significant consideration was given as to the data collection methods utilised. The use of PJGs was a particularly important design choice in this regard. These visual tools offered a developmentally appropriate means for students to reflect on and share their experiences with mathematics over the transition. They provided a basis to anchor discussion in students' own representations and helped create a comfortable and engaging space for students to voice their perspectives. During the interviews, I also remained conscious of the potential power dynamics involved. Every effort was made to foster a safe and open environment for the students. This included careful attention to my interview tone and pacing, as well as the language used in the questions.

#### ***4.7.2 Consent, assent and the right to withdraw***

As outlined earlier in this chapter, a number of primary schools were approached to recruit students to take part in the study. There was no compulsion for students to participate and I did not conduct any follow-up visit to the schools. Students were fully informed of their right to withdraw from the study at any point, without consequence. Prior to each interview, parents of the students were invited to be present and they too were reminded of the study's aims and offered the opportunity to ask questions or withdraw from the study.

For ethical engagement with students of this age, parental consent was obtained and students provided assent. This dual consent process reflects established principles of ethical research with young people, ensuring that both parents and students were appropriately informed and that the autonomy of the young people was respected throughout (Alderson & Morrow, 2011).

### ***4.7.3 Privacy***

The privacy and confidentiality of students were upheld throughout all stages of the study. All identifying information, including students' names, school names and any teacher names, was anonymised and replaced with pseudonyms. Personal details or references that could lead to identification were removed from interview transcripts and reporting.

Confidentiality was also maintained in the storage and handling of data. All electronic files, including transcripts and recordings, were stored in a secure, password-protected location and access was limited to the researcher. These measures were taken in accordance with ethical and data protection guidelines to ensure that participants' personal information remained protected at all times.

### ***4.7.4 Accuracy***

As mentioned earlier in the chapter, efforts were made throughout the process to ensure that students' views and experiences were represented as accurately as possible. All interviews were recorded and transcribed, allowing for careful analysis and the opportunity to revisit students' exact words during the interpretation process. Transcribing the interviews myself supported a deeper familiarity with the data and reduced the risk of misrepresentation. In sharing the findings, in keeping with the aim of the study, I foregrounded the voice of students where appropriate. Heeding warnings above about the potential for thematic analysis to "flatten" the data, I purposefully sought to include a good representation of quotes from the students' narratives. Where excerpts from interviews were used in the reporting of the findings, they are quoted verbatim to preserve the integrity and accuracy of the voices of students.

### ***4.7.5 Property***

All data were treated with confidentiality. In accordance with the Data Protection Act 1998 (The Stationery Office, 1998), participants were provided with information on how their data would be used and stored. They were reminded that they maintain the right to access data relating to them. All data was stored electronically in a secure password-protected storage space.

### ***4.7.6 Accessibility***

Accessibility was an important consideration throughout the research design. Given the age of the students, care was taken to ensure that the format and mode of communication used were developmentally appropriate and easy to understand. A key part of this involved the creation of two separate plain language statements, one for parents/guardians and one

specifically for the students (see Appendix C). These were carefully worded to explain the purpose and processes of the study in a clear and age-appropriate manner. The child-focused plain language statement explained what the research was about, what participation would involve and what rights participants held. It described interviews and graphing activities in simple, relatable terms, and included assurances around privacy. The accompanying child assent form further supported comprehension by summarising key points in plain, easy-to-read sentences.

In addition to these written materials, practical steps were taken to accommodate different needs. Interviews were conducted over Zoom, offering flexibility in scheduling and participation. Students were given the option to have a parent or guardian present during interviews and were reminded they could take breaks or end the interview at any time. These measures aimed to ensure that all participants felt comfortable and supported throughout the study.

## 4.8 Conclusion

Building on the theoretical, conceptual and philosophical underpinnings outlined previously, this chapter has presented the methodology of the research. A qualitative, longitudinal design was adopted to explore students' mathematical identity across the key educational transition between primary and post-primary. Informed by narrative inquiry and enactivist perspectives, the study sought to explore mathematical identity as a fluid, relational and socially situated entity. The chapter outlined how narrative methods, supported by semi-structured interviews and PJGs, enabled the collection of rich, voice-centred data from students. A small pilot study conducted in advance of the main study provided valuable learnings in refining these tools and in the recruitment of students.

The dual analytic approach involved using the Listening Guide for in-depth relational analysis and thematic analysis of narratives for the identification of broader patterns. This strategy offered a way to engage deeply with the voices of students and the relational aspects of their narratives, aligning closely with both enactivist and narrative inquiry traditions. While this dual approach enhanced the depth and breadth of the analysis, it also brought challenges. Balancing attention to individual stories with the search for cross-cutting themes required careful judgement, particularly in ensuring that students' voices were not overly generalised.

Efforts to ensure methodological rigour were threaded throughout the study. Importantly, given the age of students involved in the study, ethical principles also formed a key part of the study. Careful attention was given to informed consent, privacy and the accessibility

of research processes for the students. The next chapter turns to the students themselves, offering a presentation of the findings that brings their mathematical journeys to the fore.

## Chapter 5: Findings of the Listening Guide

This chapter presents findings from the analysis of the Listening Guide on the data collected from three students. The chapter opens with a clustering of the PJGs that provided the basis for the selection of the three students whose data was analysed using the Listening Guide. The analysis of these three students – Ciarán, Caoimhe and Saoirse – are then presented. For each student's story, it begins with my own response from the first listening, alongside a brief overview of their mathematical identity journey during their years in primary school. This draws primarily from data shared during their first interview and accompanying PJG that looked back across their years in primary school. Together, these provide important baseline insights for understanding each student's journey across the transition from primary to post-primary. In line with the study's aims, the second part of each student's analysis traces the significant experiences they described across their five interviews. Following step one of the Listening Guide, this section identifies and explores the important plots and meanings that emerged from students' narratives. I have attempted, where possible, to structure these in a chronological order to capture the flow of each student's journey. Step two of the Listening Guide is incorporated through the construction and presentation of I poems, providing further insight into how students expressed their sense of self in relation to mathematics. Finally, step three focuses on contrapuntal voice, highlighting the key relational voices that shaped each student's identity over time. Together, these layered readings aim to provide a rich, multi-voiced account of students' experiences of the transition.

### 5.1 PJGs as a starting point for analysis

The PJGs provided an entry point into how students described their relationship with mathematics across the transition. While the graphs reflect students' own relative scores, they served as a valuable prompt for reflection and discussion. Used during each interview, the PJGs encouraged students to recall experiences and articulate how they felt about mathematics at different points in time along their transition journey. These visual representations opened up insights into the changing nature of students' identity journeys. Each journey is characterised by a set of unique experiences of each student.

Given the nature of the study and number of participants involved, no separate significant analysis of these graphs was undertaken in a statistical way. Instead, a visual inspection of the graphs was carried out, allowing for an initial sense-making of the different patterns evident in the students' trajectories. This process acted as a heuristic tool, offering a starting point for deeper analytical work. It supported the identification of broad journey types

based on the shape and movement within students' PJGs, without overemphasising the absolute values of their scores. From this, three clusters were formed that reflected different transition patterns: those marked by stability, those involving recovery after disruption and those containing standout peaks. While variation existed within each grouping, the purpose of this clustering was to guide the structure of the findings and inform the selection of illustrative cases for deeper narrative analysis. These clusters are not presented as definitive findings, but as a useful methodological move to support the organisation and interpretation of the data.

**Cluster one: Stable trajectories.** Students in this cluster demonstrated a narrow range of variation in their scores across their five interviews. While there was some gradual movement in scores (one or two point variations), no significant dips or spikes were evidenced. The trajectories of these students indicated a relatively consistent relationship with mathematics across the period. These stable patterns contrast with other clusters where more pronounced shifts were observed.

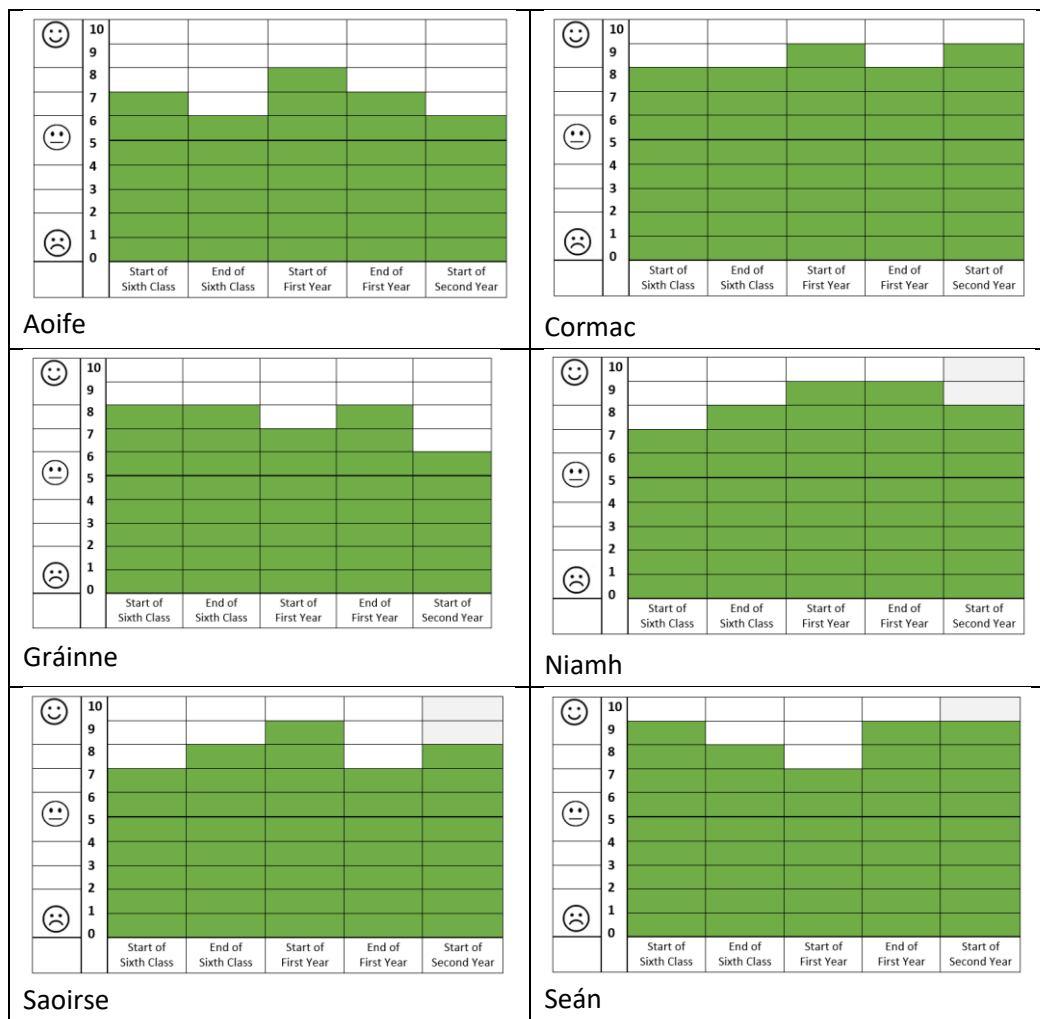


Figure 5.1: PJGS representing the 'Stable trajectories' cluster

**Cluster two: Recovery from struggles.** Students in this cluster experienced a notable dip in their scores during the transition period, often occurring early in First Year. This decline was followed by a recovery in scores, with students often returning to or surpassing their initial scores by the start of Second Year. The trajectories of these students often resembled a U-shape, reflecting their journey through a challenging period and their eventual return to stability. The cluster is distinct in that it captures a temporary disruption in students' trajectories.

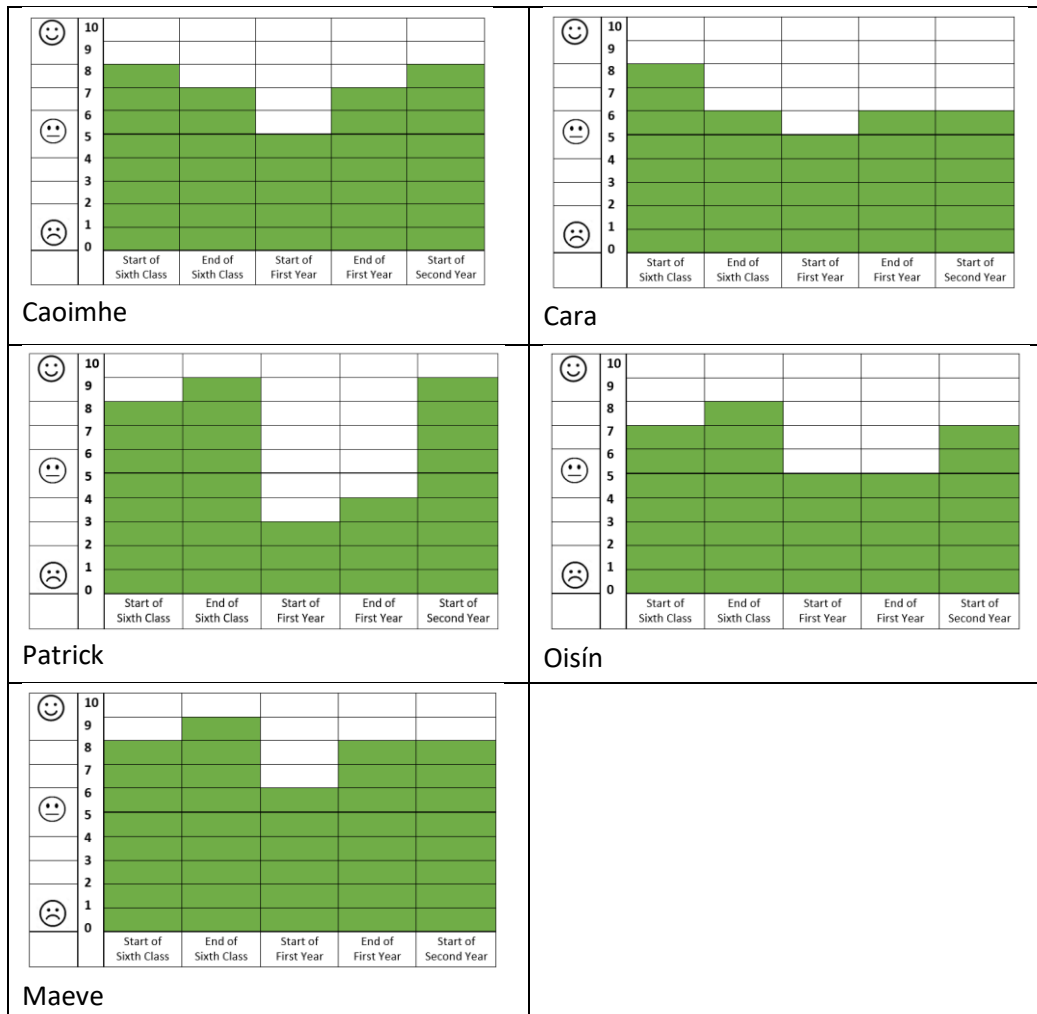


Figure 5.2: PJGs representing the 'Recovery from struggles' cluster

**Cluster three: Standout peaks.** For this group of students, their PJGs included a significant rise at some point during the transition. Following this peak, their PJG then either returned close to baseline or declined further. This trajectory pattern is notable for its sharp divergence at some point across the transition.

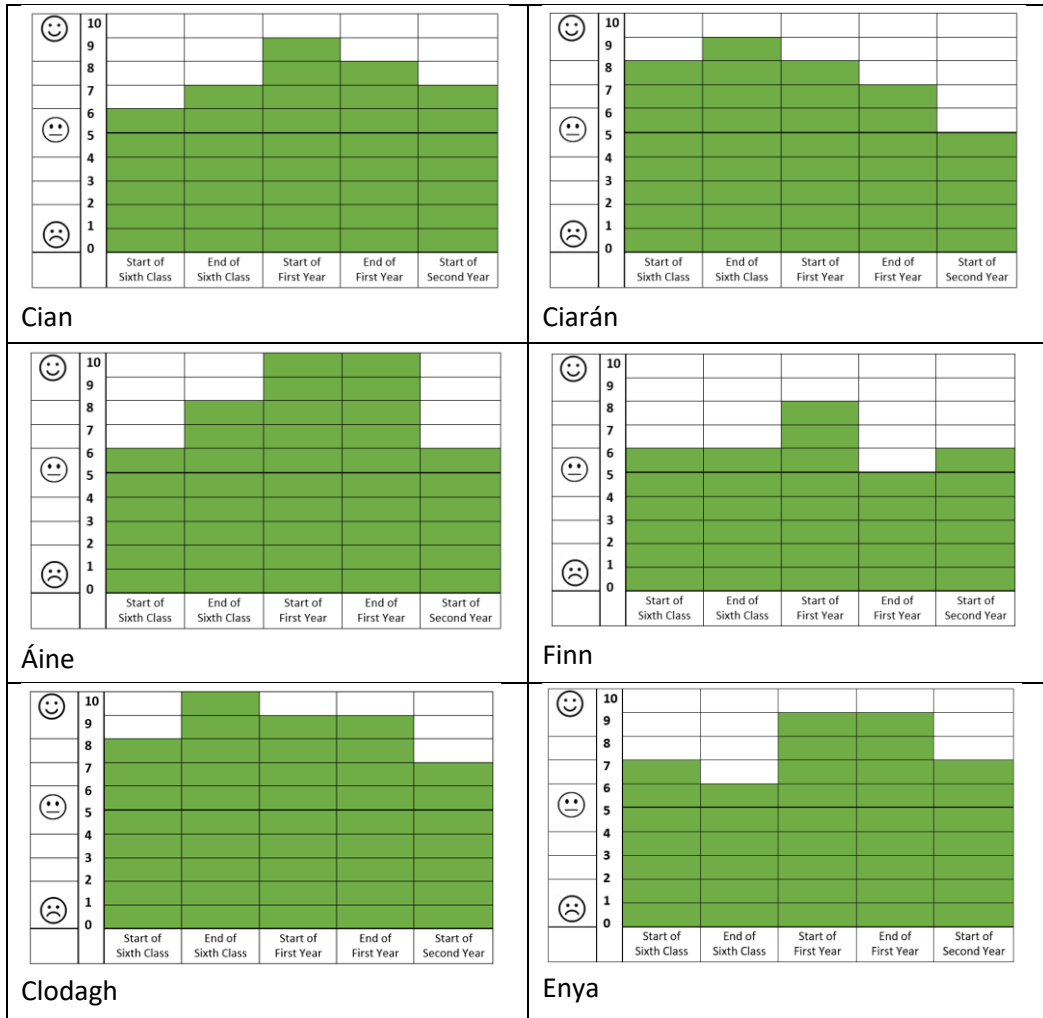


Figure 5.3: PJGs representing the 'Standout peaks' cluster

Based on broad trajectory types, three students - Caoimhe, Ciarán and Saoirse - were selected as illustrative cases for deeper analysis using the Listening Guide. Their stories, presented in the following sections (5.2, 5.3 and 5.4), offer insight into the layered and complex ways mathematical identity was negotiated across the transition.

## 5.2 Ciarán's mathematical identity

### 5.2.1 Initial researcher response

As per the Listening Guide, during the initial listening, my own thoughts, questions and wonderings were noted. As well as adding a level of reflexivity to the analysis, these initial reflections also aim to provide a foundation for a deeper exploration of students' experiences. When initially listening to the interviews with Ciarán, what stood out to me was how reflective he was about his mathematical experiences and abilities, often measuring success through self-assessment and occasional peer comparison. In the first interview, a striking observation was the clarity and vividness of his memories about learning mathematics, even from the earliest years in primary school. In my eyes, Ciarán has a very strong productive disposition towards mathematics, especially across his early interviews. I found myself wondering where this disposition came from – was it built up from his past experiences with teachers?

Ciarán's primary mathematics experience appeared consistently positive, characterised by an enjoyment of challenge. He recalled engaging class activities and valued the satisfaction of overcoming difficult problems, suggesting that his primary years helped foster a productive disposition towards mathematics. However, as he progressed into post-primary school, it became clear that when the level of challenge intensified beyond a certain point, it had a negative impact, with his productive disposition notably waning. I thought about how fragile one's identity is in relation to mathematics. There appeared to be a very fine line between a challenge that motivated him and one that appeared to overwhelm him. Striking that balance would appear critical in this instance.

Something that also stood out for me is the singling out of assessment as the biggest change in his mathematical learning when I chatted with him just over two months into First Year. While he appeared to have adjusted relatively well to other aspects of post-primary mathematics, the frequency and perceived stakes of assessments seemed to weigh heavily on him. This raised important questions for me about the role of assessment in shaping his mathematical identity at this critical juncture. Throughout the interviews, Ciarán also frequently mentioned the influence of his mathematics teachers. I wondered about the specific qualities in a teacher that he found most supportive. How did these experiences with teachers link with his strong internal drive and reflective approach to learning? Finally, when I first looked at Ciarán's completed PJG (see Figure 5.4), I was struck by how clearly it seemed to map onto the emotional arc I heard in his interviews. The steady rise through Sixth Class and into the start of First Year suggested a positive momentum. However, it is the later drop that stands out. It made me

wonder what had changed for him and whether that shift reflected a temporary dip or something more enduring.

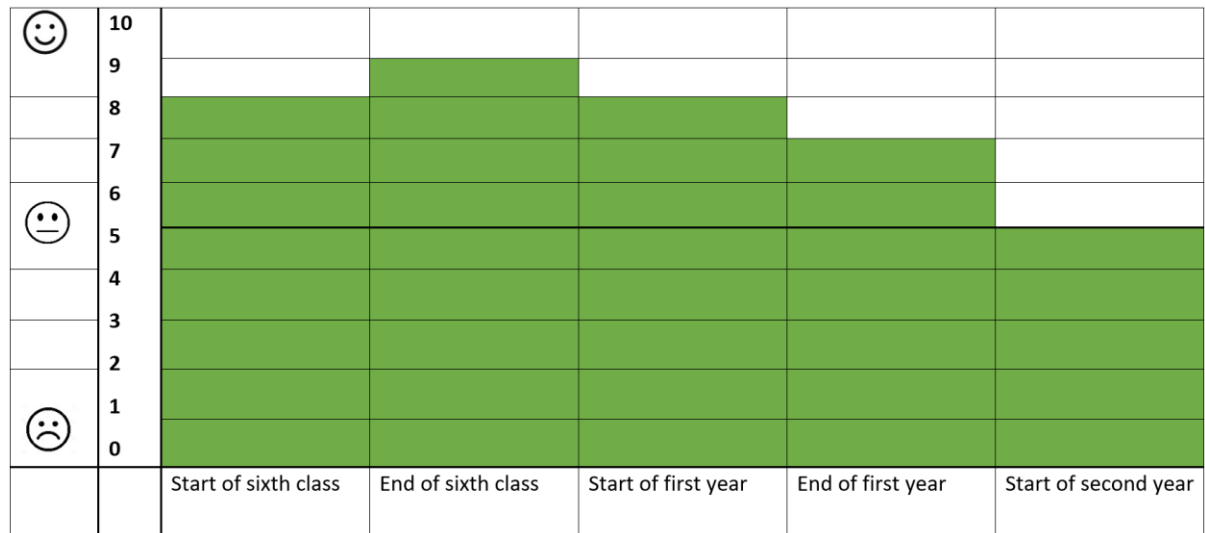


Figure 5.4: Ciarán's PJG across the transition from primary to post-primary

### 5.2.2 Ciarán's life story with mathematics

*"I kind of got much better knowing what I was doing"*

During the first interview, Ciarán shared his experiences of learning mathematics throughout his time in primary school. Using the PJG (see Figure 5.5) as a basis for the discussions, Ciarán began by sharing his early experiences in Junior Infants. His standout memory from that year centred around a confusion he had, confessing "the numbers all kind of confused me in Junior Infants because there were five of them." He spoke about how he struggled to identify and comprehend their meaning and how he just guessed the answer to questions, "I had, like, a one in five option, so I wouldn't usually get it right, sometimes I would". His recollection of his mathematics learning in Senior Infants appeared a more settled experience, as he noted, "I kind of knew what was happening." The lowest point on his PJG was associated with First Class, where Ciarán encountered difficulties with new concepts, particularly addition and subtraction. He described this period as "harder" and "awfully confusing," indicating an early awareness of the impact of struggle. When probed further, Ciarán reflected on how these difficulties altered his outlook, "It changed, like, how I kind of looked at it. Sometimes I'd look at it as in, 'Okay, so I'm going to be doing this.' But now it was kind of, like, 'Uff, I'm doing maths.'"

😊	10								
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		Junior infants	Senior infants	First class	Second class	Third class	Fourth class	Fifth class	Sixth class

Figure 5.5: Ciarán's mathematics PJG across his years in primary school

From Second Class onwards, Ciarán's relationship with mathematics showed a steady improvement, primarily linked to better understanding. This continued into Third Class, where he recalled feeling confident in his grasp of mathematical concepts and warmly remembered how mathematics was taught that year by his teacher. He particularly valued group problem-solving tasks, recounting, "I remember all of us putting down our answers" and appreciated how his teacher would probe his thinking: "Mr. Park would come over our shoulders and make us explain what we were doing." In Fourth Class, despite disruptions caused by school closures during the COVID-19 pandemic, Ciarán's engagement with mathematics remained resilient. His main concern appeared to be maintaining understanding: "once you understood what you were getting, it was fine." One challenge he identified with online learning was the increased difficulty in paying attention, highlighting that this mattered more for learning mathematics than other subjects, "With the other subjects, even though I was doing stuff, I didn't really need to move on like we did in maths. We had to make sure we moved a chapter, like, each week." This suggested that mathematics may have been prioritised during the closures, with the mention of the word "chapter" also hinting that the mathematics textbook was used to structure learning at this time. Fifth Class marked another stage of adjustment, as Ciarán transitioned back to in-person school life. He described a period of "just getting back into it," acknowledging occasional mistakes and a need for greater attention to detail: "I got like parts wrong and I didn't look over it." Despite these challenges, he recounted positive memories of group work, highlighting how collaboration supported his learning: "When you do it in a group, you can, I suppose, if you get it wrong, the others will help you and you can help someone along if they're struggling." Finally, reflecting on his experience during the first half of Sixth Class, Ciarán identified "decimals" and

“distance” as topics that caused him some initial difficulties. However, he spoke about working through these difficulties and getting “used to it”.

### 5.2.3 Ciarán’s identity across the transition from primary to post-primary

#### Learning mathematics in Sixth Class

*“having the challenge kind of made it a bit more enjoyable”*

During the first interview, Ciarán began by commenting on the level of difficulty he encountered, explaining, “it's kind of difficult but it's kind of as difficult as maths should be.” Importantly, Ciarán did not view this difficulty negatively and embraced and welcomed the challenge that mathematics offered. This early insight into his mindset revealed key facets of a productive disposition that would consistently emerge across his interviews and is further explored below.

Overall, while completing the second PJG (see Figure 5.4), Ciarán expressed a strong sense of satisfaction with his mathematics learning in Sixth Class. He again emphasised the level of challenge as an important and positive feature of his experience. He found that the balance struck that year made it enjoyable, “I'd put it at about a nine. I didn't find anything, like, too hard. Nothing was hard, but nothing was easy either, it was, like, a bit of a challenge”. Indeed, in the narrative that followed and represented in the I poem below (see Figure 5.6), Ciarán explained that this balanced context created a desire for him to want to learn mathematics.

<p>I didn't find anything like too hard I wanted to learn I think</p> <p>I kind of feel I want to complete</p> <p>I'm going to do it</p>	<p>You could use other methods</p> <p>You felt You built up lots of ways</p>	<p>(it stayed in) our head We had a sum We already knew (helped) us along the way</p>
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Figure 5.6: I poem describing Ciarán's view of learning mathematics in Sixth Class [Interview 2]

Notably, the third column of the poem portrays a strong sense of collective mathematical learning, highlighting a classroom environment where understanding and confidence were actively built and shared. His use of “our”, “we” and “us” suggests that learning was not viewed as an individual pursuit but rather as something communal and collaborative. The introduction of the “you” voice within the poem is particularly striking. It signals an outward direction in his reflection and recognises shared strategies and the generalisation of good mathematical practice beyond himself. It may be seen as an internal encouragement and a type of imagined advice to others.

The ordering of lines within the poem is also significant. At the beginning we see Ciarán’s personal motivation and readiness to learn. This quickly moves into collective pronouns, suggesting that his individual learning was deeply rooted in and supported by a communal classroom environment. This collective experience appears to feed back into his personal growth, as reflected in the latter part of the poem where he returns to the “I” voice with renewed determination (“I want to complete this”/ “I’m going to do it”). Throughout this narrative, Ciarán demonstrated a notable productive disposition toward mathematics, characterised by persistence and enjoyment of challenge. This reflection offered a sense that understanding, motivation and confidence were coming together in a very positive way for Ciarán, with his narratives reflecting a very affirming relationship with mathematics by the end of Sixth Class.

### **View of self as a mathematics learner**

*“maybe a bit slow to start, but once I get the hang of it, I kind of just fly off”*

In his opening interview, Ciarán shared insights into his view of himself as a mathematics learner, that highlighted important features of his mathematical identity. Captured in the I poem below (see Figure 5.7), Ciarán described a learning pattern in which initial difficulty was often followed by rapid growth and confidence once he was satisfied that he understood the learning at hand.

I wouldn't consider  
I'm okay  
I guess  
I don't really get too many sums wrong  
I can do a lot of sums in my head  
I get the hang of it  
I kind of just fly off  
I'm shown it  
I don't get it at first  
I get shown it again  
I understand it  
I know how to  
I knew  
I was doing in my maths  
I'm doing well in it

Figure 5.7: Ciarán's I poem on his view of himself as a mathematics learner [Interview 1]

The poem opens with the lines: “I wouldn’t consider”, “I’m okay” and “I guess”, that reflect a hesitancy and modesty in his self-assessment. He appeared initially cautious in claiming he was a competent mathematics learner. However, as the poem unfolds, there is a clear progression towards greater confidence and affirmation. The phrases “I understand it” and “I know how to” highlight a strengthening sense of understanding and agency. Notably, Ciarán’s account suggests that his relationship with mathematics was not fixed but responsive to his learning experiences. His ability to “fly off” once understanding was established points to a strong potential for growth when the conditions for success were present. The consistent use of the “I” voice reinforces the personal nature of this reflection, highlighting how Ciarán is actively positioning himself within the learning process. Even in moments of uncertainty, the voice remains focused on “I”, suggesting a sense of ownership over his mathematical journey.

### **Looking ahead to post-primary**

*“I hope I don’t start calling them the wrong name”*

As the move to post-primary school approached, Ciarán's reflections increasingly centred on what lay ahead. In his response to a question about learning mathematics next year, Ciarán explained that he expected it to be somewhat more difficult, “I kind of think it'll be sixth class maths, just a bit, a little bit more trickier.” He expressed confidence that the mathematics learning he experienced in Sixth Class would provide him with a solid foundation for what was ahead. Interestingly, when prompted on the source of his expectations, Ciarán shared that they were shaped by conversations with two friends already in post-primary school. They had

reported finding mathematics "trickier" in First Year. These insights appeared to inform a realistic and cautiously optimistic outlook for Ciarán. As captured in the I poem below (see Figure 5.8), a sense of uncertainty and anticipation permeated his narrative. Associated with the use of the pronoun "I" are phrases including "hope", "guess" and "don't know", which highlight the speculative and reflective nature of his thoughts. The phrase "I think" appears frequently, perhaps indicating that this is something Ciarán had thought significantly about recently and had formed expectations about what was ahead.

<p>I guess</p> <p>I think about it I think that it's going to be I will get the hang of it I think I'm prepared I can I don't think many I don't know</p> <p>I kind of think I think it would be</p> <p>I think it'd be</p> <p>I hope I don't I think it will</p>	<p>(Dropping) you down into the deep end</p> <p>You kind of know You're going to have You kind of either</p> <p>You kind of have to get to know</p>	<p>They'll ease you in</p> <p>They reassure</p> <p>We are all kind of excited and We are in the subjects</p> <p>We're so used to one teacher They let you know (how) they teach</p>
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Figure 5.8: I poem describing Ciarán's expectations of what mathematics learning will be like in post-primary school [Interview 2]

The structure of the poem portrays an emotional mixture of anticipation, anxiety and reassurance. Early lines emphasise individual uncertainty through the dominant "I" statements, capturing Ciarán's internal processing of the upcoming change. However, as the poem

progresses, two important shifts occur; the emergence of a "you" voice and a movement towards "we" language. The "you" appears to function as both a self-instruction and a generalisation about what students must do ("You kind of know," "You're going to have"), suggesting that Ciarán is beginning to externalise his concerns and frame them in broader, shared terms. This may serve as a coping mechanism, helping to normalise any potential upcoming challenges. The eventual movement into "we" language signals a collective experience, reflecting a broader class-level nervousness and excitement about transition. Ciarán situated himself within a community of peers who were facing the same unknowns. This likely helped buffer some of his worries and promote a sense of solidarity with his peers.

Specific concerns about the change in teachers were also prominent. Moving from a single class teacher model in primary school to multiple teachers in post-primary school was a particular source of anxiety. Ciarán highlighted the risk of confusion and the fear of mixing up teachers' names: "I hope I don't start calling them the wrong name." Ciarán's mention of teachers' methods changing year to year further highlights how important the teacher is to him and points to an unease he has about adapting to different pedagogical approaches. Encouragingly, reassurances from his Sixth Class teacher seemed to have had a stabilising effect. Ciarán recalled that their teacher emphasised they would be "eased into" mathematics learning in First Year, a narrative of support that directly counteracted his fear of being "dropped into the deep end." Ciarán acknowledged the likelihood of initial challenge, but also reaffirmed a belief in his own understanding and resilience: "It will be a challenge at the start, but then I will get the hang of it." This comment again points to Ciarán's persistent and underlying productive disposition that frames difficulty not so much as a threat, but as a temporary hurdle to be overcome.

### **Feelings towards learning mathematics at the beginning of First Year**

*"you just kind of like maths a little less"*

Taking place a few months into his time in post-primary school, the third interview opened with Ciarán describing his current views of learning mathematics in his new environment. While his initial response to the question was a positive one, "It's going pretty well actually", the narratives that followed revealed something different. As captured in the I poem (see Figure 5.9), his initial experiences were somewhat languid. Ciarán claimed not to have any struggles with his current mathematical learning. However, instead of being buoyed by such experiences, the poem reflects an apathy towards his mathematics learning ("I don't find it

great” / “I don’t know” / “I’m finding it okay”). Of note, in his claim about not struggling, the word “yet” was added as if to suggest this might change in the future.

<p>I think I don't find it great I don't know</p> <p>I'm finding it okay I understand it I know what I'm doing I'm not struggling yet I suppose I'd say I'll be either</p>	<p>You just kind of like maths a little less You don't like maths as much You're actually doing them</p>	<p>(Like) we did in primary</p>
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Figure 5.9: I poem capturing Ciarán's initial feelings about learning mathematics in post-primary school [Interview 3]

When probed further on these feelings towards mathematics, Ciarán explained that the new subjects he had been exposed to in early post-primary school were more interesting. This, he suggested, contributed to a decline in his feelings toward mathematics. Notably, when describing this, Ciarán shifted from the first-person "I" to the more generalised "you" voice. Rather than stating directly, 'I like maths less,' he framed his experience as something that might happen to anyone: "you just kind of like maths a little less." This distancing suggests a possible de-personalisation or a protective strategy, where Ciarán externalises his emerging dissatisfaction. The structure of the poem reflects this transition. Moving from a hesitant series of first-person claims (e.g., "I don't find it great") before the "you" voice takes over at precisely the point where feelings towards mathematics become more negative. This subtle narrative shift highlights an important moment of identity negotiation, where Ciarán manages his changing relationship with mathematics by partially detaching from it. In addition and as flagged above, Ciarán noted that the increased regularity of some subjects in post-primary school, including History and Geography, had resulted in them feeling more rewarding and engaging than mathematics: "you're actually doing them every week, it's not like, kind of stopping and starting like we did in primary school."

**Differences between primary and post-primary school**

*"taking something out from your maths set that I never used before in primary"*

In reflecting on the difference between learning mathematics in primary and post-primary school, Ciarán made reference to the note-taking, “They’re also giving you notes to write and look over”. As evident in the I poem below (see Figure 5.10), Ciarán spoke to the emphasis on exercises and notes.

<p>I suppose</p>	<p>You learn</p> <p>You just exercises</p> <p>You notes</p> <p>You an exercise</p>	<p>They’re giving</p> <p>They’re also giving</p>
<p>I suppose</p> <p>I suppose the materials</p> <p>I remember just taking something out</p> <p>I never used before in primary</p> <p>I’ve used the calculator much more</p> <p>I don’t mind</p> <p>My pride gets in the way</p> <p>I want to just do it down on a page</p>	<p>You’re in different classrooms</p>	

Figure 5.10: I poem taken from Ciarán's narratives around the differences in his mathematical learning between primary and post-primary school [Interview 3]

In the poem, the shifts in pronouns are insightful. Initially speaking through "I", Ciarán frames these changes to his learning experience as personal observations. However, as the poem progresses, his use of "you" and "they" becomes more prominent, subtly distancing himself from the new structures and routines of post-primary mathematics learning. The “they” voice, referring to the teachers, positions him more passively within the system (“They’re giving”). Similarly, the "you" voice generalises the experience suggesting that these new practices, such as taking notes and completing exercises, are routine expectations placed upon all students. This narrative shift may reflect an ongoing process of adjustment, where Ciarán is still negotiating his place within his new environment. The poem also captures concrete examples of these shifts. Ciarán recalled using tools like a protractor for the first time; “taking something out from your maths set that I never used before in primary”, which symbolises the unfamiliar practices of post-primary mathematics. While he reported “not minding” the increased use of a calculator, the closing lines of the poem reveal a deeper emotional undercurrent. His comment that “my pride gets in the way” points to a strong sense personal responsibility and a desire to maintain independence in his mathematical thinking. Born out of

his time in primary school, Ciarán valued doing calculations manually, linking this as a marker of competence and perhaps even authenticity as a mathematics learner. The poem suggests that Ciarán’s mathematical identity was being actively negotiated through small, such personal acts of resistance and hesitation.

**Repetition in learning**

*“I’d prefer something new”*

Following his initial insights as shared above, when Ciarán was asked to describe specifically the mathematical learning he had encountered so far, he noted a level of repetition with learning already completed in primary school. The I poem (see Figure 5.11) created to reflect this theme, shows a desire from Ciarán for something new or different.

<p>I don't think          I found it          I won't say easy            I did lines and angles            I'd be probably          I'd prefer something new            I feel          I am getting bored          I'm a little sleepy          I kind of zone out</p>	<p>We've done it all before            We'd done that in fifth            We're writing          We're using</p>
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Figure 5.11: I poem formed from Ciarán's narratives on the theme of repetition [Interview 3]

Mentioning specifically the area of “lines and angles”, he noted that he has experienced similar learning as far back as Fifth Class. Throughout the poem, the frequent use of the pronoun “we” points to a collective experience among Ciarán and his classmates, a sense that the class as a whole is revisiting familiar learning. While initially framed quite neutrally (“We’re writing / We’re using”), the repetition gradually takes on a more negative turn, especially in the closing lines. Ciarán’s feelings shift from mild dissatisfaction (“I’d prefer something new”) to expressions of disengagement (“I feel I am getting bored / I’m a little sleepy / I kind of zone out”). This movement suggests that repetition was tedious and a real threat to Ciarán’s motivation and participation in his mathematics learning. Notably, this is the first time across his narratives that Ciarán explicitly associated mathematics learning with boredom or disengagement. It

represented a sharp departure from the enthusiasm and willingness to embrace challenge he had shown in primary school.

During the same interview, when completing his PJG, Ciarán again made reference to this issue of repetition. In justifying his score of eight for this period, he remarked, “it's gotten a bit repetitive.” Importantly, he immediately followed this with a speculative reflection about the future: “I'd say by next year, I'll be either at a nine or it'll be low. It'll depend how it goes.” This comment reveals how significant the issue of meaningful challenge and novelty is to his mathematical identity, a one that could either sustain or undermine his positive relationship with mathematics going forward.

**A different view of assessment**

*“you have to pass your Christmas and Summer test”*

The topic of assessment did not feature in Ciarán’s narratives from the first two interviews. However, in the third interview, he introduced it when asked to describe the biggest changes since making the move to post-primary school. Amplifying its new-found significance, Ciarán noted that studying for assessments was the biggest change he encountered in the opening months in his mathematics learning: “I suppose studying for the tests is the biggest part of it”. Having completed two assessments so far, Ciarán described them as being “very different” to what he had experienced in primary school. Having been used to weekly low-stakes tests in mathematics, Ciarán spoke about the significance of preparation and study that was now required in post-primary school. The I poem below (see Figure 5.12) captures Ciarán’s emerging relationship with assessment.

<p>I found them very different</p> <p>I looked over it I still wasn't sure I completely had it I was a little nervous I'd want to do it quickly I knew the stuff I just wanted them to start I could get through them</p> <p>I suppose</p>	<p>You get something wrong</p> <p>You kind of look over it You went wrong</p>	<p>We've had two We go for a month</p>
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Figure 5.12: I poem on the theme of assessment in early First Year [Interview 3]

The early lines of the poem convey a mix of uncertainty and nervousness despite his efforts to prepare: “I still wasn’t sure / I was a little nervous.” This nervousness contrasts sharply with the quiet confidence and resilience that in his earlier reflections on tackling mathematical challenges. Particularly striking is the shift in pronoun use in the latter half of the poem, moving from “I” to “you” when describing mistakes and errors. This may suggest a certain detachment that Ciarán held from the mistakes he made in the assessments, almost creating a buffer between himself and perceived failure. Of note, at the end of the third interview, when asked about the rest of the year, Ciarán singled out the Christmas and Summer assessments as being the things he was least looking forward to in relation to mathematics.

As Ciarán approached the end of First Year, assessment remained a dominant theme in his narratives. In the fourth interview, he reflected on two experiences - the Christmas assessment and a subsequent class test. In contrast to the apprehension he had expressed earlier in the year, Ciarán now described these experiences with a degree of satisfaction. Speaking in the first person throughout the opening section of the I poem (Figure 5.13), he expressed pride in his performance, noting, “I was happy enough / I got 78.” This confidence, however, quickly gave way to a rising sense of pressure as he looked ahead to the Summer test.

A subtle but important shift is observable in the language of this poem. The phrase “I have to” and “I want to show”, signals the emergence of a more pressurised tone. Indeed, a striking feature of the poem is the dominance of the “I” voice. This underscores how deeply personal and internalised assessment has become for Ciarán. Unlike previous poems where “we” and “you” featured more prominently, sometimes signalling a space for collective meaning-making, here the narrative is almost exclusively individualised. The repetition of “I” speaks to a reflective stance and also to a rising self-imposed pressure. His account is no longer about learning as growth or conquering enjoyable challenges, instead, it has become a solitary negotiation of performance and expectation. The solitary use of the “you” voice (“you have to pass”) externalises the pressure of assessment, hinting at an impersonal standard imposed from outside. Meanwhile, the “we” voice appears only in fleeting references to shared activity. Their minimal and detached presence is in contrast to their prominence in other I poems, possibly suggesting that assessment has become a more individualised and isolating experience for Ciarán. The social context of learning is perhaps fading into the background and replaced by a more singular focus on personal accountability and performance.

<p>I suppose  I was happy  I was  I done well enough  I got 78  I was  I was happy</p> <p>I was happy enough  I got  I  I knew  I had done wrong</p> <p>I have to do summer exams</p> <p>I've set myself a high standard</p> <p>I just think  I will have to  I don't remember  I could get a full question wrong</p> <p>I want to show  I did well</p>	<p>You have to pass</p>	<p>We did a test</p> <p>We did this year</p>
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Figure 5.13: I poem of Ciarán's experience of assessment in First Year [Interview 4]

The stakes of the assessment have increased, as performance in the Summer exam is now tied to a decision on which class he is placed in next year. However, Ciarán was not particularly concerned about this and suggested that the real pressure stems from his own high standards. His desire “to show I did well” reflects an identity increasingly shaped by performance and external validation. His references to high standards, such as “I’ve set myself a high standard”, speak to an increasing link between his self-worth and assessment success. This shift also introduces vulnerability, with the “I don’t remember” and “I could get a full question wrong” lines conveying some doubt and apprehension.

Intertwined with this narrative is a growing difficulty around studying, which Ciarán describes as a personal challenge. Despite recognising its importance, he admitted, “I find it hard to study,” particularly for extended periods. His account of reviewing pre-worked examples, “just looking at numbers and just looking at examples”, reveals a sense of passivity and a lack of real connection to the learning. Study seems to have become a site of emotional effort for him.

Ciarán’s reflections in this interview suggest a shift in how he experiences mathematics and in how he views himself. He has moved from a confident challenge-seeker to someone going through the motions and just fulfilling expectations placed on him by his new surroundings.

**A turning point moving through First Year**

*“I feel I’m not overly good at it”*

In the fourth interview, a noticeable shift in tone emerged in his narratives. Speaking openly about the increasing difficulty of mathematics, he described a growing sense of disconnection and frustration. The I poem (Figure 5.14) reflects this shift vividly. Unlike earlier interviews, where Ciarán spoke with curiosity and resilience, here his voice is more subdued, with his statements littered by self-doubt and detachment. The frequent use of “just”, “not” and “boring” conveys a flattening of his enthusiasm. Further, his description of feeling “middling” and “lost” suggests a diminished confidence in his abilities and view of self.

<p>I think          I’m middling          I feel          I’m not overly good          I’m not like failing          I think          I’m finding some parts of it very hard          I can just do it          I find the maths class can be a long          I find it boring          I just sit there          I can get a bit lost then</p> <p>I’m doing stuff          I know</p> <p>(Confuse) me          I do think it does get very difficult</p>	<p>They kind of make a twist on it</p>
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Figure 5.14: I poem representing Ciarán’s experience with mathematics learning in First Year [Interview 4]

This poem is marked by the almost exclusive use of the pronoun “I”. The absence of “we” “you” or “us” signals a more introspective view and even perhaps a further withdrawal from collaborative learning. It signals he is somewhat alone in navigating what has become somewhat of an opaque experience. While he acknowledges that he is “doing stuff” and “not failing” his self-perception seems increasingly shaped by what he cannot do or understand. His mention of the teacher introducing “a twist” to familiar material shows the fragile balance he is

trying to maintain in clinging to his previous understanding. The poem indicates Ciarán felt this understanding was being stretched perhaps beyond what was comfortable for him. There is a brief moment of optimism in this interview. When discussing the upcoming Classroom-Based Assessments (CBAs), Ciarán expressed enthusiasm for the potential group-based nature of the work. He referred to a visit from older students who described the CBAs as collaborative and this excited him, “so it sounded good.” This small but important moment reinforces a theme from earlier, in which collaboration and peer interaction play an important role. The appeal of working in groups again may represent more meaningful and motivating mathematical experience for him.

### **Changing teacher mid-year**

*“she doesn’t really know us that well”*

In the fourth interview, Ciarán described how his mathematics class underwent a teacher change partway through the year. This marked a shift in his learning experiences. He recounted the new teacher’s approach as procedural and less interactive, “she’s doing a lot of, you kind of explain the exercise and let us do maybe ten of the sums then and see how we got on.” Ciarán framed this as disengaging. He expressed a clear desire for a more dialogic and collaborative approach, “Well if the teacher could make it like more enjoyable, and allow us to talk about it more and get kind of people to answer questions.” A sense of frustration surfaced in his depiction of this approach, “she kind of just talks and talks and talks”, leaving little space for the voice of students. Ciarán’s narrative indicated that the transition to the new teacher was far from seamless. He reflected that “the whole class had it rough when we swapped teachers,” highlighting the collective impact of the change on peer learning. Also of note is that the timing of this shift coincided with the class beginning Algebra, already identified by Ciarán as a challenging topic. He felt that this added to the difficulty, “That was very difficult because we’re with a new teacher.” This change in personnel introduced a relational disconnection, as Ciarán observed that the new teacher was unfamiliar with him and his peers, “she doesn’t really know us that well”. The lack of familiarity Ciarán described between the students and the new teacher appeared to have contributed to feelings of discomfort in the learning process.

The score of seven on his PJG (see Figure 5.4) was the lowest score so far and indicated a disruption to his relationship with mathematics. He attributed his declining confidence both to the rising difficulty of mathematical learning and to the change in teaching style. Comparing his former and current mathematics teachers, he emphasised that the previous teacher “taught at a high standard” and introduced “tough exam-like questions”, an approach Ciarán welcomed. He

recalled how the previous teacher pushed him and his peers, something that stood out to him especially in comparison to other subject areas, “he kind of increased the difficulty on it compared to the other classes.” Ciarán also welcomed the strong collaborative learning community built in the classroom, with peers supporting each other, “kind of everybody either struggled with it together or one person got it and everyone helped and kind of got to understand it together.” This level of challenge, combined with a supportive peer atmosphere, created a learning environment in which Ciarán thrived. However, he noted that the new teacher “does it a bit more different”. This change appears to have contributed to a decline in Ciarán’s relationship with mathematics and emphasised the importance of the teacher to him.

### **Moving to higher level mathematics**

*“there’s definitely a big leap”*

In the final interview, Ciarán’s narratives offered insights into the transition to Second Year. This move represented, in ways, a double transition for him, as he moved into a new year, and also into a higher-level mathematics class. At the beginning of the year, Ciarán and his peers were streamed into higher- and ordinary-level classes. He described this change as a “big leap”, a phrase that surfaced multiple times in his reflection. The I poem below (Figure 5.15) captures his reflections at this point. It portrays a learner caught in a state of adjustment. Ciarán was no longer supported in the same way as he was before and not yet fully confident in this new class.

<p>I suppose I’m in higher level maths I suppose I was kind of guided more along</p> <p>I suppose I still feel a bit guided</p> <p>I still feel like it’s not the worst I’m not excited to walk in I kind of just get on with it I’ll just try my best</p> <p>I suppose</p>	<p>You’re more independent</p> <p>You’re kind of</p>	<p>They kind of They kind of took off They kind of brought it up a level (Some of) them found it difficult They feel like I do</p>
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Figure 5.15: I poem representing Ciarán’s move to Second Year [Interview 5]

The poem opens with a cluster of tentative “I” statements, many of which are hedged by uncertainty (“I suppose”/ “I kind of”). This repetition suggests that Ciarán is trying to reconcile his new position in higher-level mathematics with a level of self-doubt. The shift to the “you” voice (“You’re more independent”/ “You’re kind of”) introduces a more generalised stance. It is as if Ciarán is stepping outside his own experience to make broader claims about what Second Year learning is like. The middle section of the poem returns to the “I” voice but now with a more resigned, flat tone (“I still feel like it’s not the worst subject / I’m not excited to walk in / I kind of just get on with it”). These statements reflect emotional disengagement and a sense of mathematics as something to “get through” rather than something to be enjoyed and suggests a shift towards compliance. The line, “I’ll just try my best,” reveals an ongoing desire to persevere, but is tinged with a sense of obligation and compliance rather than intrinsic motivation.

In the closing stanza, there is a change of focus to others, with “they” becoming the dominant pronoun. Speaking firstly to his teacher, Ciarán talked about how they have increased the level of challenge (“They kind of took off / They kind of brought it up a level”). The final two lines suggest a shared sense of struggle among peers. He acknowledged that the transition to higher level mathematics took some of his classmates by surprise and that they found it difficult to keep up, just like him. However, unlike previous instances, Ciarán did not use “we” voice when referring to his peers in this instance. This may indicate a sense of personal detachment from the group, whereas previously a sense of community was very important to him.

### **Increasing difficulty and challenge**

*“I’m kind of finding it harder”*

When completing the last segment of his PJG (see Figure 5.4), Ciarán paused for some time before settling on a score of five. This was the lowest score Ciarán had provided not only on the PJG spanning the transition, but also across the previous PJG used to cover his life story with mathematics (see Figure 5.5). Ciarán attributed the downturn on his PJG to the growing difficulty of mathematics learning, particularly with multi-step and word-heavy problems. These were perceived as more time-consuming and too cognitively demanding. They led to frustration and moments of self-doubt for Ciarán, especially when a small mistake could unravel an entire answer. Within this decline, he still retained a faint thread of belief in his capacity to improve. He spoke of doing “fine” and showed glimpses of a residual productive disposition, although it appeared considerably subdued compared to previous interviews. This signalled a notable turning point in Ciarán’s mathematical identity. He conveyed a low to moderate level of satisfaction, with his reflections tinged with strain and uncertainty. He described Second Year

mathematics as requiring “a lot more effort” compared to First Year, noting a further increased demand needed for study and concentration. The I poem that follows (Figure 5.16) offers a powerful window into his mindset at this point. It is dominated by the first person singular “I” voice, which shows the deeply personal and internalised nature of the struggle. Ciarán does not externalise blame to others and appears to carry the full weight of his mathematical learning experience on his own shoulders.

<p>I'm kind of finding it harder  I'm kind of finding that a bit tougher  I feel there's a lot  I have to be fully focused  I have to do even more  I can see a drop  I'd say  I kind of can see  I'd say</p> <p>I'm doing fine  I can still  I can still do better  I know  I can do better</p> <p>I  I've kind of  (stun) me for a second  I like find them harder  I don't want too much  I don't mind words  I have to keep looking back  I think it starts to get tedious</p> <p>I feel pressure</p> <p>I kind of still like the challenge  I have to try get my head around them  I usually do  I'll get by  I can do  I will always try to do better  I do well in my tests</p>	<p>You can forget stuff</p> <p>You get one part wrong</p>
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Figure 5.16: I poem representing narratives describing Ciarán's perceived difficulty Second Year [Interview 5]

The poem's two opening statements establish a tone of effort and difficulty. The repeated use of "I have to" signals increasing pressure and obligation, a marked shift from Ciarán's earlier enjoyment of challenge for its own sake. The frequency of modal verbs (e.g. "can", "have to", "will") points to a tension between capacity and compulsion. Ciarán holds on to the possibility of success, but it now seems contingent on more effort and discipline. The middle portion of the poem grows more fragmented. Statements like "I've kind of" and "(stun) me for a second" reflect his deep uncertainty. During this stage, Ciarán paused significantly and utters an "I" without any accompanying word, he repeats the "I" and speaks then to how the questions in mathematics have somewhat overwhelmed him in Second Year. The insight into how new mathematics learning can "stun" him initially, suggests that his confidence has begun to falter under the pressure of new learning. The affective language here, including, "tedious" "pressure" and "drop" suggests emotional fatigue, and it is at this point that Ciarán briefly breaks from his dominant "I" voice. The only two instances of "you" in the poem ("You can forget stuff" and "You get one part wrong") are especially revealing. They appear at the height of the emotional intensity and seem to project his experience outward, offering a kind of distancing or generalisation. Rather than framing his own errors as personal failings, Ciarán uses "you" to communicate a broader idea around how mistakes in mathematics are easy to make and consequential, regardless of who you are. The poem does not end in defeat as Ciarán expresses a belief in his ability to improve. The closing lines are less resolute and more reflective of a determination under strain: "I'll get by / I can do / I will". This willingness to strive for improvement in the midst of challenges, while evident, substantially lessened compared to his initial interviews.

### **Another step up in assessment**

*"there's a lot more to remember, like formulas and stuff"*

Linking back to earlier themes, assessment once again featured prominently in Ciarán's narrative during the final interview. They portrayed a further intensification in the perceived stakes and difficulty since First Year. A key challenge he identified was the cognitive demand involved, specifically, the need to recall formulas and understand layered concepts. These insights are captured in the short I poem below (Figure 5.17), where Ciarán's narrative focused on his experience of recent tests. The poem traces a journey from disorientation to understanding, mirroring the mental steps he felt were required to successfully navigate assessments. Ciarán described an initial phase of confusion when encountering test questions, where he felt uncertain and struggled to grasp their meaning.

I think the tests are harder	(Getting) your head around those You have Your head around those You understand the question
I found at the start	You're looking at it You kind of are going 'what is this?' You've to figure it out

Figure 5.17: I poem based on Ciarán's narratives on assessment [Interview 5]

The structure of this poem is telling. It begins with an “I” voice, marking Ciarán’s individual recognition that “the tests are harder.” This quickly shifts to a series of “you” statements, signalling a notable change. Indeed, the dominant use of “you” in this poem is significant. Rather than describing the experience solely from his own perspective, Ciarán constructs the challenge of assessment as something external. This generalising move may serve as a form of emotional distancing and, in a way, softening the vulnerability of his own struggle. It could also be an attempt to make sense of his difficulty with assessment by framing it as a shared reality among students. The repetition of “your head around those” and the framing of understanding as an effortful process suggests that the primary challenge for Ciarán was in interpreting and unpacking the questions themselves. The lines “You're looking at it / You kind of are going ‘what is this?’” convey a feeling of disorientation. The poem ends with an imperative: “You've to figure it out”. This reasserts a demand for personal responsibility, though still framed in the second person. The tone of this statement, particularly with the use of “you”, may suggest that it echoes a message he or his peers received from his teacher when struggling through such questions.

Towards the end of the final interview, when Ciarán was asked to discuss what he was most looking forward to and was not looking forward to for the time ahead, with assessment raised in the latter. He spoke to wanting to get his CBA completed and also a desire to exceed in assessments, “Um, probably just to get my CBA done on time and that I do well in my tests”.

#### 5.2.4 Contrapuntal voices

This section presents the final stage of Ciarán’s Listening Guide analysis in the identification and interpretation of contrapuntal voices. As described in Chapter 4, this analytic step attends to the layered voices within students’ narratives. These voices can often surface

tensions, harmonies and silences that can offer another insight into mathematical identity. For Ciarán, three key voices emerged across his five interviews that provide a deeper understanding of how his mathematical identity was negotiated across the transition. Each voice interacts with broader themes such as assessment and the role of teachers, which shaped how Ciarán saw himself as a mathematics learner. The first voice identified is a voice of challenge and confidence, which dominated Ciarán's early interviews and reflects a strong productive disposition. In contrast, a voice of disengagement emerges more prominently in later interviews, marked by an emotional withdrawal and a sense of doubt. The third, and increasingly dominant, is the voice of pressure and performance, shaped by Ciarán's evolving relationship with assessment and expectations, both external and self-imposed.

**5.2.4.1 Voice of challenge and confidence.** This first voice reflects Ciarán's early mathematical identity as a confident and motivated learner who embraced challenge and found satisfaction in working through such learning experiences. It was particularly prominent during the first two interviews, spanning his reflections on Sixth Class and his expectations for post-primary school. The voice captures the essence of a strong productive disposition where his understanding, effort and persistence were tightly interwoven with enjoyment and belief in his ability as a mathematics learner. In the second interview, when reflecting on his experiences in Sixth Class, he emphasised that the right level of challenge contributed to his enjoyment of the subject:

Nothing was hard but nothing was easy either, it was like a bit of a challenge but having, like having the challenge kind of made it a bit more enjoyable, like I wanted to learn to know how to do it because of the challenge.

This insight highlights a key feature of the voice of confidence. Ciarán frames difficulty or challenge as a motivator, as opposed to a threat. Even more so, the presence of a challenge became a reason for Ciarán to engage more deeply in the learning process. In the same interview, Ciarán goes on to further describe his view of himself, "I'm going to do it, because I don't know why, it's just what happens when someone gives me a challenge" (Interview 2).

A strong sense of personal growth also shaped this voice. In the first interview, when reflecting on his earlier years of learning, Ciarán offered a considered summary of how his confidence tended to grow over time: "Maybe a bit slow to start, but once I get the hang of it, I kind of just fly off." This pattern of initial hesitation followed by improvement or growing confidence was one he returned to frequently in his first two interviews. Even as he looked ahead to post-primary school, Ciarán maintained a belief that he could manage new difficulties. He expressed confidence in his ability to adapt, "It will be a challenge at the start, but then I will

get the hang of it" (Interview 2). Through this time, Ciarán held a firm belief that understanding in learning would be achieved through effort and persistence.

While this voice was most prominent during his time in primary school and the early stages of First Year, traces of it persisted even when he faced challenges. For instance, in the final interview, despite describing increased difficulty, Ciarán remarked, "I can still do better... I will always try to do better." Although more effortful in tone, it suggested that this voice continued to play a part in his mathematical identity. It highlighted a thread of persistence even as other voices, such as doubt or pressure, began to dominate. As the following sections show, the voice of confidence and challenge is seen increasingly contending with rising feelings of doubt and pressure.

**5.2.4.2 Voice of disengagement.** The second voice captures a noticeable shift in Ciarán's mathematical identity as he progressed through post-primary school. The voice was marked by emotional distancing, growing uncertainty and, at times, a declining motivation. The first signs of this voice appeared in the third interview, a few months into First Year. Although Ciarán initially described his experience as going "pretty well," this was followed by more hesitant and qualified reflections, "I think I don't find it great" and "It's gotten a bit repetitive". The uncertainty in his language signalled a softening of the confidence and interest he had previously expressed. When asked further about his current views of mathematics, Ciarán explained, "I don't know, it's just been introduced to new subjects... you just kind of like maths a little less." He did not present disengagement as a deliberate choice. Instead, he described it as something that had happened gradually, almost passively.

This sense of detachment became more marked in the fourth interview. Here, Ciarán began to describe the mathematics classroom itself as a space where he felt less connected and less settled. Speaking about his new mathematics teacher, he commented, "It's a lot of listening to the teacher and I just sit there. I can get a bit lost then". The shift in teaching style from interactive to more procedural appeared to leave Ciarán feeling detached. Whereas before, his mathematical learning experiences had been a source of energy for Ciarán, these new experiences had left him "just sitting there," and this appeared to feed into an increasing sense of disconnection with mathematics. The same interview revealed that repetition of familiar learning content was also beginning to affect his engagement. Reflecting on topics such as lines and angles, he noted, "I'd prefer something new... I feel I am getting bored". While earlier in his narratives, Ciarán had spoken about challenge as something he enjoyed, by this point the absence of novelty and meaningful challenge seemed to have undermined his relationship with

the subject. Notably, the idea of boredom was absent from his previous descriptions of mathematics but had now entered his narratives in a negative way, reflecting the voice of disengagement.

In the final interview, this voice was at its most pronounced. As Ciarán pointed to an increase in the perceived difficulty of mathematics learning, there was a strong sense of frustration and emotional fatigue, “I find the maths class can be a long, long class... I find it boring... I just sit there... I can get a bit lost then”. These reflections signalled a deeper shift in how he related to mathematics. While this voice did not indicate a complete loss of belief in his ability, as Ciarán tried to express hope that he could improve, his emotional tone had clearly changed. This voice of disengagement signifies Ciarán’s relationship with mathematics is built around managing and getting by. In a way, the voice reflects the emotional toll of the transition process, with changes here seen to impact his previous confidence and positive engagement with mathematics.

**5.2.4.3 Voice of pressure and performance.** The final voice that emerged across Ciarán’s narrative was a voice of pressure and performance. This voice grew more apparent as Ciarán progressed through First Year and into Second Year and was shaped by his evolving relationship with assessment. While Ciarán had always valued doing well in mathematics, this voice reflected a shift in the meaning of success. In his earlier interviews, success was framed in terms of understanding and personal growth. However, as time went on, it became increasingly tied to test scores and performances. Indeed, as assessments became more formal and frequent, this voice grew in intensity.

While tests were a feature of Ciarán’s primary school experience, they did not appear prominently in his early reflections. In his third interview, Ciarán described the biggest shift in mathematics learning since entering post-primary school, “I suppose studying for the tests is the biggest part of it”. He contrasted these new assessments with what he had experienced in primary school, noting that they required greater preparation and a different kind of effort. At this point, his descriptions revealed an underlying nervousness: “I still wasn’t sure I completely had it... I was a little nervous”. This emerging voice reflected a new layer of emotional burden associated with mathematics learning. For Ciarán, it revolved around preparation, performance and the consequences of not doing well in tests. Notably, he began to shift from speaking about learning in general terms to speaking about “tests” and “scores,” which became increasingly central in his narratives. By the fourth interview, this voice had intensified further. Ciarán reflected on the importance of test results and described his Christmas test with a mixture of

satisfaction and pressure, “I was happy enough... I got 78.” Here, the satisfaction of a good result was closely linked to the expectations he held for himself. It suggests that the pressure he experienced was not solely external, but also internalised. He also expressed concern about the cognitive demands of upcoming tests, noting: “I just think there’s so much I will have to remember and if I don’t remember the rules or steps then I could get a full question wrong”. This reveals the emotional stakes of assessment for Ciarán, as it threatened to disrupt his sense of overall competence.

By the final interview, this voice had become even more pronounced. Reflecting on Second Year mathematics, Ciarán described the increased difficulty of both the content and the assessments. He noted: “There’s a lot more to remember, like formulas and stuff” (Interview 5). Ciarán portrayed the cognitive load of assessment as he attempted to navigate unfamiliar and abstract material under pressure. Despite these challenges, Ciarán continued to express a strong desire to do well, noting, “I want to show I did well”. This encapsulates the emotional core of the voice of pressure and performance, that Ciarán views achievement as proof of his effort and capability. It reveals how tightly success had become linked with his mathematical identity. Unlike the earlier voices, which focused more on curiosity or enjoyment, this voice positioned mathematics as something to perform successfully in. What makes it distinctly contrapuntal is the way it juxtaposes Ciarán’s varied reactions to assessment, from moments of accomplishment and pride to experiences of pressure and nervousness. This internal tension became more prominent over time for Ciarán, as performance increasingly came to define success in mathematics. The voice reinforced his high standards and commitment to his mathematics learning, but also introduced emotional strain and a growing pressure to prove himself.

**5.2.4.4 Interplay of voices.** Each of the voices identified above offers distinct insight into aspects of Ciarán’s mathematical identity. Through their interplay, the complexity of his transition becomes most visible. These voices did not operate in isolation, but coexisted at different points, often revealing tensions within Ciarán’s experience of mathematics across the transition.

In the earlier stages of the study, the voice of challenge and confidence was clearly dominant. Ciarán presented himself as a motivated learner who enjoyed mathematical challenge and believed in his ability to persist through difficulty. However, as he moved through First Year and into Second Year, this voice was increasingly accompanied and even interrupted by the voice of disengagement. This was particularly evident as repetition and shifts in classroom interaction began to take their toll. Ciarán’s language became more passive and uncertain,

reflecting an emotional withdrawal from a subject that had once energised him. At the same time, the voice of pressure and performance grew steadily in influence. What initially began as a quiet undercurrent became a louder presence in his narrative as more formal assessments became more prominent. This voice often sat in tension with his earlier confidence. Ciarán still wanted to do well and held himself to high standards, but the meaning of “doing well” had shifted. Success was no longer framed solely in terms of understanding or growth. It had become tied to test scores and the avoidance of failure. Moments of overlap between the voice of pressure and the voice of disengagement were especially telling. At times, Ciarán continued to express effort and determination, yet also described feeling confused or emotionally detached. These coexisting voices reflect the strain of managing rising expectations while feeling less connected to mathematics learning itself. Meanwhile, echoes of the voice of confidence persisted in moments of self-assurance, such as his belief that he could “still do better”, but these became increasingly fragile and infrequent.

Overall, the interplay of voices in Ciarán’s narrative reveals a mathematical identity that was not static but negotiated and reshaped across the transition. The confidence that characterised his primary school experience was gradually tested by the relational and structural changes in post-primary school. The emergence of pressure and disengagement alongside his continued effort illustrates the emotional and identity work required to navigate this transition. The voices offer a layered and sometimes conflicting portrait of Ciarán’s evolving relationship with mathematics.

### *5.2.5 Summary*

This section presented a layered analysis of Ciarán’s mathematical identity using the Listening Guide approach. Drawing on five interviews, I traced how Ciarán described and made sense of his mathematical experiences, with a particular focus on his evolving sense of self, his emotional and relational responses to learning, and the broader structural shifts that shaped his journey. In the early stages, Ciarán expressed a strong productive disposition towards mathematics learning, embracing challenge and linking success to effort and understanding. Over time, however, the emotional tone of his narrative shifted. A sense of disengagement emerged as learning experiences became less interactive and perceived difficulties with mathematics learning began to grow outset Ciarán’s comfort zone. At the same time, the stakes of assessment rose and featured more prominently in his reflections. Ciarán’s view of success came to be measured less by growth and more by performance and expectations. The interplay of his contrapuntal voices revealed the tensions Ciarán experienced as he adapted to changing

learning environments and demands. They offered a nuanced view of identity as negotiated rather than fixed. Ciarán's story also highlighted both the resilience and fragility of mathematical identity in periods of significant change.

## 5.3 Caoimhe's mathematical identity

### 5.3.1 Initial researcher response

Caoimhe presented as a perceptive and conscientious learner. Across her five interviews, she offered insightful reflections on her learning in mathematics, with a notable level of self-awareness. Caoimhe spoke of primary school mathematics as generally accessible and often enjoyable, with many topics learned quickly and with confidence. High test scores and moments of personal insight reinforced her positive self-perception and she rarely expressed the kind of negativity towards mathematics that she observed amongst some of her classmates.

Her journey across the transition was eventful. Initially, she expressed confidence in her mathematical abilities. She knew she had done well in primary school and seemed to expect that this would continue. However, as she moved into post-primary school, her tone shifted. It felt like the change of pace and the introduction of new learning experiences seemed to knock her off course. She appeared to take time to settle in and adjust to post-primary school and underwent a difficult First Year, during which her relationship with mathematics seemed to dip. While the transition can offer a fresh start for some students, it can be unsettling for others, and for Caoimhe, this appeared to be the case. Listening to her story reminded me how personal and uneven the transition can be.

Caoimhe consistently placed emphasis on assessment and I was concerned by how dominant this theme became for her once she entered post-primary school. As she spoke about revision lists and study routines, it was clear this held deep significance for her. Her experience of mathematics seemed to shift from understanding to remembering. I wondered how this shift was internalised by her? How did it impact her view of mathematics? It was also striking that she noticed limited opportunities for creativity or spontaneity in her mathematics learning. However, as she reached Second Year, I met a student much more settled. She appeared happier with her classroom, peers and mathematics learning. Still, I was left wondering how much that difficult First Year and her evolving relationship with assessment continues to shape her view of mathematics. This was worthy of further investigation.

What emerged from Caoimhe's PJG (see Figure 5.18) was a clear depiction of how the transition unsettled, and eventually stabilised, her relationship with mathematics. Her score, initially high, dropped sharply during First Year before rising again in Second Year. That steep dip mirrored the tone of her narrative and that sense of being unsettled and knocked off balance.

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😐	6					
	5					
	4					
	3					
☹️	2					
	1					
		Start of sixth class	End of sixth class	Start of first year	End of first year	Start of second year

Figure 5.18: Caoimhe’s mathematical PJG across the transition

### 5.3.2 Caoimhe’s life story with mathematics

*“I never found maths that hard”*

In her first interview, Caoimhe presented as a capable mathematics learner. Her relationship with the subject appeared closely tied to her perception of difficulty and her ability to grasp and understand concepts. One of her early narratives reflected the comfort and ease she associated with mathematics across much of her primary school years: “I never found maths like that hard. It wasn't like my favourite subject, but it wasn't, like, a subject I hated.” In completing the first PJG looking back over her relationship with mathematics across her years in primary school (see Figure 5.19), Caoimhe often based her scores on whether the learning felt “easy” or “hard.” In Junior Infants, for example, she recalled, “I don't remember it being that hard”, while for Senior Infants, she compared her performance in mathematics to other subjects, noting, “I remember being better at, like, English ... rather than maths”. However, she also recalled her report card in Senior Infants being “not as high as it was in junior,” suggesting that she was already attentive to feedback, such as report cards, in gauging her feelings towards mathematics.

😊	10								
	9								
	8								
	7								
😐	6								
	5								
	4								
	3								
😞	2								
	1								
		Junior infants	Senior infants	First class	Second class	Third class	Fourth class	Fifth class	Sixth class

Figure 5.19: Caoimhe’s mathematics PJG across her years in primary school

As she progressed through primary school, her reflections became more connected to specific learning experiences and to her teachers. In First Class, she found mathematics “a lot easier” and in Second Class she simply remarked, “I didn’t find it hard.” By Third Class, she began to position herself in relation to her peers, sharing, “other people in the class were, like, not getting it, but I got it,” especially around multiplication. This idea of picking things up more quickly than her peers would resurface in later interviews and points to a confidence in her own mathematical understanding and ability. However, her experience in Fourth Class was less positive. Caoimhe described disliking her teacher, which affected her level of interest and engagement, “sometimes I would just, like, not really, not pay attention, just not, like, be that interested in learning it.” Yet even here, she maintained, “I didn’t find it hard,” suggesting that while she appeared to be somewhat disengaged, her sense of competence remained steady. Fifth Class stood out as a clear high point for Caoimhe. She recalled receiving a “really high score” on her report card and rated this period with a perfect ten on her PJG (see Figure 5.19), her highest score across both graphs. She explained, “I just like picked that up. Even though no one told me... it just was easier for me,” again highlighting her ease in understanding new concepts. In Sixth Class, she continued to report positive experiences, saying, “I don’t find it hard or anything,” and described learning about Chance as “really good fun.”

### 5.3.3 Caoimhe’s identity across the transition from primary to post-primary

#### Perceptions of learning mathematics

*“I don’t really like, like that stuff”*

As noted above, Caoimhe’s view of learning mathematics was closely tied to her perception of difficulty. During her first interview, she shared an expectation that mathematics in Sixth Class would be “harder,” but this had not been the case. The following I poem (see Figure 5.20) captures her reflections on learning mathematics in Sixth Class and highlights the contrast between her expectations and her actual experience.

<p>I thought it was going to be harder</p> <p>I don't find it that hard I already got it</p> <p>I was doing it quicker than everyone I don't know I think I'm good I do them in my head</p> <p>I'm not I'm not really sure I would get it first a lot I'd get it right</p>	<p>You can do</p> <p>(How did) you do that? You have to write it</p>	<p>We did already We're just like adding on We were doing</p>
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Figure 5.20: I poem representing Caoimhe’s experience of learning mathematics in Sixth Class [Interview 1]

The I poem reveals a blend of external and internal dialogues. The “we” voice, as in “We were doing”, suggest a collective experience of mathematics as something routine and familiar. It reflects a sense of security in the familiar learning context of primary school, where mathematics learning built on previous knowledge. The shifts to “I” and “you” introduce a more personal and somewhat conflicted perspective. Caoimhe’s statements, “I don’t find it that hard” and “I already got it”, reflect her confidence and the ease by which she understands mathematics and reinforces a mathematical identity as someone who excels with learning. However, woven into this confidence are moments of self-doubt: “I’m not really sure,” and “I don’t know.” The repetition of “I’m not” and “I don’t” suggests that underneath her capable exterior, some uncertainty lingered. The shift to “you” introduces a hint of frustration or external pressure. The line, “You have to write it”, suggests that the expectations of the learning environment clashed with her own preferences, in this instance for mental calculations.

**Closing out primary school**

*“I like don't remember where we learned that”*

A significant plot identified in Caoimhe’s second interview centred around her final few months of Sixth Class. She described this period as getting “trickier” and spoke about struggling to recall how to work with concepts related to Time and Speed. The accompanying I poem (see Figure 5.21) highlights a noticeable drop in confidence compared to her earlier reflections.

<p>I still don't really understand</p> <p>I get wrong I don't really I forget what they're called</p> <p>I didn't get it (everyone in) my class seem to I like don't remember</p> <p>I don't know I just thought I tried to work it out I don't really get</p> <p>I was kind of just confused I didn't really think about it I just I don't really know how to (explains it to) me I still don't really get it</p>		<p>We do like mental maths We correct them They are like</p> <p>They're like, how fast</p> <p>(Where) we learned that</p> <p>(How) they got the answer</p>
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*Figure 5.21: I poem describing Caoimhe’s struggles with mathematics learning over the final months of Sixth Class [Interview 2]*

The poem reveals a tone of confusion and frustration. The repeated use of “I don’t” and “I didn’t” underscores a growing sense of uncertainty. Lines such as “I didn’t get it” and “I don’t really get how they got the answer” suggest her understanding and confidence were becoming increasingly unsettled. This marks a shift from her earlier narratives that portrayed relative ease and competence in terms of her mathematics learning. The “we” voice in the poem, reflects the collective experience of her class and contrasts somewhat with her own individual experience. While the group appears to be working through these tasks together, Caoimhe expresses a sense of being left behind, remarking that “everyone in my class seem to” get it, while she did not. This perceived gap between her understanding and that of her peers signals a vulnerability in her

mathematical identity that had not appeared before. In the past, where interruptions were shared, they were linked to her views of a teacher, whereas here it is centred around her understanding of mathematics learning. Peer comparison, a theme that appears again in later interviews, surfaces here as a key influence on how she sees herself as a mathematics learner. Related to this, the shift from a “we” voice to the “they” voice points to an increasing distance from her mathematics learning and that of her peers. The lines, “(How) they got the answer” and “They’re like, how fast” reveal Caoimhe’s struggle to make sense of how easily her peers appeared to grasp the material. They highlight a sense of disorientation and self-doubt she feels in the face of social comparison. Her efforts to work with the material, “I tried to work it out” lead only to further confusion: “I was kind of just confused” and “I still don’t really get it.”

Elsewhere in the same interview, Caoimhe noted that she was getting more questions wrong in class. She explains that she forgot previous learning from earlier in the year and has encountered unfamiliar concepts that left her unsure of whether they had ever been covered previously. This phase of uncertainty and confusion represents a critical point in Caoimhe’s journey that will be discussed further in this section. Its timing is particularly significant, occurring just before her transition to post-primary school. It highlights a certain worry that has set in ahead of her move to post-primary school that has led her to doubt her ability and understanding.

### **Assessment matters**

*“I got a really high score on my like report card”*

As noted earlier, Caoimhe placed importance on assessment and related feedback. In her first interview, she made several references to her report cards, recalling years where high scores contributed to positive narratives. These results became central to how she measured progress and her level of competence in the subject. In the second interview, Caoimhe reflected further on assessment, particularly her recent experience of completing her standardised mathematics test in Sixth Class. She described struggling with certain questions, especially those involving time and felt she had answered many incorrectly. Listing off her recent test scores, including one she highlighted as her lowest, at 60%, Caoimhe gave a detailed account of her results and what she remembered from the recent standardised test. The poem below (see Figure 5.22) illustrates the unsettling impact these experiences had on her sense of understanding.

The poem opens with a sequence of “I got” statements, showing Caoimhe’s close attention to her test scores as indicators of her performance. While she initially minimises the

impact of her lowest result (“I don’t think it’s bad”), the surrounding uncertainty (“I don’t know really about the time part” / “I like forgot how to do them”) suggests a deeper unease. These reflections reveal a tension between her self-image as a competent learner and the experience of getting things wrong. As her poem moves into her reflections on misunderstanding and forgetting learning, phrases like, “I got most of those questions wrong” and “I like forgot how to do them” convey a fragile sense of understanding. The lines “I’m not sure” and “I kind of know” signal confusion and hesitation, pointing to a sense of disorientation in her learning rather than a stable understanding.

<p>I had a test  I think it was the Drumcondra test  I have my results  I got 95%  I got 75%  I got 60%  I think it’s good  I don’t think it’s bad  (But) I don't know  (When) I got 60%  I don't know really about the time part  I don't remember doing any time questions  I don't think I actually saw my Drumcondra test results  I haven't got my report card yet  I'm not sure  I kind of know  (Which questions) I got right  (Which questions) I kind of guessed on  I don't think  I'm not desperate to know the results  I kind of already know them</p> <p>I kind of forgot  I got most of those questions wrong  I like forgot how to do them</p>	<p>We started doing  We haven't done before  We learned</p>
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Figure 5.22: Caoimhe's I poem on assessment in primary school [Interview 2]

Toward the end of the poem, the reference to her report card introduces a different kind of tension. Caoimhe suggests she is “not desperate to know the results,” perhaps as a way to protect herself from potential disappointment. This marks a shift from earlier interviews, where report cards were sources of affirmation and pride. The dominance of the “I” voice

throughout the poem highlights how deeply personal Caoimhe’s experience with assessment was. There is a noted absence of the “you” voice, which may indicate a lack of external dialogue or feedback. The limited use of “we” towards the end of the poem also suggests that while there may have been shared classroom experiences, the test results themselves were something Caoimhe processed individually. The poem reinforces that, for Caoimhe, assessments were a hugely prominent feature and very much tied to her mathematical identity at this time.

**Post-primary school beckons**

*“I wouldn't say looking forward to, I'm just not like, dreading it”*

As Caoimhe approached the move to post-primary school, her feelings about the upcoming changes in her mathematics learning reflected a mix of uncertainty and cautious optimism. The two I poems below (see Figures 5.23 and 5.24), taken from her first two interviews, illustrate her narratives when she was asked about the upcoming move.

<p>I'd say it will be fine</p> <p>I didn't find it as big of a jump I think it will be just kind of similar to that I'm not sure I'm not like scared</p> <p>I wouldn't say looking forward to I'm just not like, dreading it I'm just thinking of it</p>	<p>(when) you listen to people</p>
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*Figure 5.23: Caoimhe’s I poem on looking ahead to mathematics in post-primary [Interview 1]*

In her first interview, Caoimhe compared the move to post-primary school to a previous transition in primary school, between Third and Fourth Class and suggested she didn’t expect it to be too difficult. However, the poem above reveals more nuance. The opening line, “I’d say it will be fine” reflects a certain level of optimism, while “I didn’t find it as big of a jump” suggests that she was drawing confidence from a past transition. However, the line “I’m not sure” introduces an element of uncertainty and doubt about what lay ahead. The absence of strong emotions, either excitement or fear, is notable in this poem, perhaps surprising given the topic. Statements such as “I wouldn’t say looking forward to” and “I’m just not like, dreading it” were quite neutral, suggesting she was managing her expectations. The line, “(When) you listen to people” introduces an interesting external influence. It implies that her understanding of the upcoming transition was shaped somewhat by what others had told her. The dominance of the “I” voice suggests that Caoimhe was internalising and trying to make sense of these messages.

In the second interview, Caoimhe returned to the topic of post-primary mathematics with a slightly more reflective tone. The poem below (see Figure 5.24) captures how her expectations were shaped by conversations with others, including a childcare leader who warned that mathematics “started getting really hard”. References to Algebra and new topics illustrate both her apprehension and her efforts to prepare herself mentally for the transition.

<p>I remember I used to do I used to go to childcare I asked one</p> <p>I just remember that I thought that was Algebra I'm not sure</p> <p>I don't know</p> <p>(If) I'm stuck</p> <p>I don't feel that bad I never found maths, like, that hard I'm not sure</p> <p>I don't feel like that bad about it (If) I'm ever like struggling I can always get like a tutor</p> <p>I do think</p> <p>I already, kind of have an idea</p>	<p>(Maybe that) you can</p> <p>(If) you can</p>	<p>They said it started getting really hard</p> <p>(Ask) them</p> <p>They can like help</p> <p>(If) we're learning like new stuff (If) we're just learning like harder topics We've already learned</p> <p>We're doing Algebra We're going to do something We've like, kind of learned We might do in first year</p> <p>We're going to do</p>
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Figure 5.24: Caoimhe's I poem on looking ahead to mathematics in post-primary [Interview 2]

The “you” voice, which appears sparingly, reflects her concerns about the future classroom environment. In particular, she questioned whether she will have the same level of access to her mathematics teacher in post-primary school (“I don’t know”, “(If) you can”, “(Ask) them”, “(If) I’m stuck”). This uncertainty highlights the contrast between the familiar support she received in primary school and the unknown structures that lay ahead. For Caoimhe, having access to help when she’s struggling in her mathematics learning is crucial and the potential loss of this support creates some unease.

Throughout the poem, there is a notable scattering of tentative phrases: “I’m not sure”, “I don’t know” and “maybe”. These expressions of uncertainty appear across both the first and second halves of the poem, suggesting not a passing hesitation but a deeper ambivalence. They point to a learner who is trying to reconcile past confidence with the unpredictability of what lies ahead. Interestingly, despite these worries, Caoimhe balances her concerns with cautious optimism. The lines “I don’t feel that bad” and “I never found maths, like, that hard” suggest that she is drawing on past success to maintain a degree of reassurance. Additionally, her “we” statements in the second half of the poem signal that she does not feel alone in these experiences and signal an imagining of the transition as a shared move. These “we” statements reflect the predictions she held about the type of mathematics learning that lay ahead. She wonders about learning new topics in post-primary school and preferred the idea of building on topics she already knows. Her reflections suggest that much of her anticipation was shaped by second-hand information shared by her friends, a visiting representative from a neighbouring post-primary school and her childcare provider. The poem reveals that despite her belief that her primary school experiences had prepared her reasonably well for the mathematics ahead, there was strong evidence of uncertainty at this time for Caoimhe.

### **A first taste of mathematics in post-primary**

*“I wasn’t really doing that much maths, I was doing like more writing”*

Two months into her time in post-primary school, Caoimhe noted that the pace of learning had increased and the learning experiences in the mathematics classroom were very different to what she was used to in primary school. She provided a breakdown of a typical mathematics lesson, as involving writing down text, explaining how much of the lesson was spent copying information from PowerPoint slides:

She has like a book of like PowerPoints or something ... she kind of goes through those and they have like sample questions in them, and then we like write down, she

highlights what we're going to write down. But then, yeah, that's kind of how we mostly do maths, she just put up the PowerPoint and like, flicks through them.

Caoimhe felt that much of her classroom time was spent writing down definitions and her discomfort with this approach is captured in the I poem below (see Figure 5.25).

<p>I wasn't really doing that much maths I was doing like more writing</p> <p>I'd prefer I might not like understand (If she gives) me an example I might understand it I prefer doing questions myself I'll understand it after a while</p> <p>I think</p> <p>I don't think I'll understand it</p> <p>I think I'd have to do</p> <p>I thought it was much better (If) I didn't like know how to do it I much preferred that</p> <p>I think</p>	<p>You kind of have to write You don't really like read You're writing You have to just write</p>	<p>We got like ten questions We did that</p> <p>We don't like</p> <p>We're doing kind of similar stuff (Until she gives) us sample questions</p> <p>We don't really use it We only used it like one day We only used it like once We were doing</p> <p>We kind of did like basically the same thing</p> <p>We're actually, moving on</p>
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Figure 5.25: I poem on Caoimhe's learning mathematics in the first two months of post-primary [Interview 3]

The poem opens with a sense of disconnection, "I wasn't really doing that much maths." The learning experiences Caoimhe encountered were alien to her, so much so that she claimed

that she was not doing that much mathematics at all. The repeated emphasis on “writing” (“I was doing like more writing” / “You have to just write”) suggests that Caoimhe felt this method of learning was unproductive and did not align with her previous experience of learning mathematics. Her discomfort with these new approaches is emphasised in the I statements “I’d prefer” and “I prefer doing questions”. For Caoimhe, understanding mathematical concepts appears tied to the practice of working through these questions. The “I” voice dominates much of this narrative, reflecting it as a personal issue for her. The “you” voice does appear also in this section, with three of the four lines referring to writing, highlighting the imposed nature of the approach and something that felt externally controlled. This shift to “you” functions as a distancing mechanism, allowing Caoimhe to externalise her discomfort and present these expectations as something done to her, rather than something she owns or chooses. Interestingly, the “we” voice appears intermittently throughout the poem, indicating that she shared this experience with her classmates. Lines such as “We don’t really use it” and “We’re doing kind of similar stuff” suggest that her peers were also experiencing these new and confusing learning experiences. However, the “we” voice is used more in relation to what the class is doing, while the “I” voice focuses on her personal preferences and frustrations. This subtle distinction highlights how her struggles with the learning approaches were deeply personal, even though the experiences were shared with peers. The final part of the poem reflected a turn in Caoimhe’s narrative as she recounted a positive experience involving an educational website used during a lesson. It included tutorial videos and sample questions, a format that aligned much more closely with her preferred learning style. Reflecting on this experience, she described it as “much better”, highlighting how rare it was to encounter such interactive tools.

Revisiting this topic again during her final interview, Caoimhe reflected on these early experiences of learning in First Year. While the poem below (see Figure 5.26) is short, it offers a powerful reflection and insight into her experiences with a year almost passed.

I just wrote down definitions I don't know I didn't really like I didn't really understand it I didn't understand the definitions I didn't understand how to do it I wasn't used to that type of maths
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Figure 5.26: I poem on Caoimhe’s initial encounters with learning mathematics in post-primary school [Interview 5]

This short but powerful poem reflects Caoimhe's early sense of disconnection from mathematics in First Year. The repeated use of "I didn't understand" captures the depth of her confusion and unfamiliarity with the learning experiences she encountered. The simplicity of the language and repetition of negation ("I don't know"/ "I didn't really like"/ "I didn't understand") convey a sense of overwhelm. The absence of any collective "we" or instructive "you" further reinforces how isolating this experience was for Caoimhe. Unlike earlier parts of her narrative, where her relationship with mathematics was shaped by confidence or something that was shared with her peers, here she presents herself as alone and uncertain. The poem encapsulates the mismatch Caoimhe experienced between her preferred ways of learning and the actual experiences she encountered in First Year. It illustrates how quickly this mismatch translated into uncertainty for her.

### **A new teacher**

*"Sometimes she kind of expects you to already know"*

Caoimhe expressed particular dissatisfaction with her experience of learning mathematics under her new post-primary teacher. As noted earlier, she struggled to connect with the learning experiences being offered, describing them as largely unhelpful and heavily reliant on written work. When asked about the biggest difference between mathematics in primary and post-primary school, she immediately focused on the teacher. She spoke warmly of her Sixth Class teacher, recalling activities such as games and whiteboard tasks that helped her learn. She also described how that teacher was quick to pick up on signs of confusion or difficulty and would purposefully dig deeper to help build understanding. In contrast, she felt her first-year teacher tended to move through material too quickly, expecting students to "figure it out, like by yourself." She described how learning was sometimes introduced with the assumption that students already knew certain concepts, which left Caoimhe feeling lost. Caoimhe had previously identified the impact of teacher relationships on her engagement with mathematics, most notably when reflecting on Fourth Class, when she recalled a lack of connection with her teacher as contributing to a dip in her feelings towards mathematics. This tension is clearly articulated in the I poem below (Figure 5.27), where Caoimhe described her frustration at not being able to use her own approaches or methods. She explained how her new teacher has asked her to use unfamiliar methods, even when her own made more sense to her. She expressed disappointment that using her own approach in a test would not be recognised, describing the experience as "learning the thing all over again."

My teacher she does like her own methods  I think it kind of makes it more confusing I did it my own way in the maths test I kind of have to I have to learn the different like way I can find my way like easier I still would have to do it like her way	We would have done
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Figure 5.27: I poem on Caoimhe’s frustrations with learning approaches prescribed by her teacher in First Year [Interview 3]

This poem underscores the conflict between Caoimhe’s established understanding and her teacher’s expectations that ran contrary to this. The line “My teacher she does like her own methods” sets the stage for this tension, as it signals that the teacher’s approaches dominated the classroom. The line “I still would have to do it like her way” captures a loss of agency, while “I kind of have to like learn things again” reveals her frustration at having to re-learn ways of working she felt she already knew. For a student who previously took pride in figuring things out for herself, this new approach appears very restrictive. The preference for her own methods and her belief that these are more effective signal a clash between her mathematical identity and the classroom norms being imposed by the teacher. The brief appearance of the “we” voice, in “We would have done” implies a shared prior experience with her classmates, likely referring to the approach used in primary school. However, the dominance of the “I” voice again highlights how personal and isolating this had felt for Caoimhe.

### Changing assessment

*“I feel like you kind of have to study more”*

Across the final three interviews, Caoimhe offered rich insights into how assessment shaped her experience in post-primary experience. As noted earlier, tests and scores were significant to her sense of competence in mathematics. However, following her move into First Year, she quickly noticed a marked shift in how assessment featured in her learning. From her perspective, assessment now seemed to structure the learning process itself and it was less associated with a way of checking understanding. In her third interview, Caoimhe reflected on her experience preparing for her first mathematics test in First Year. She described receiving revision lists, working through multiple pages of content and attempting sample questions. When unsure of how to solve particular problems, she turned to the textbook for explanations, something described as time-consuming and frustrating. The I poem below (Figure 5.28) distils this experience, highlighting her changing views on assessment.

<p>I had, like, a maths test today  I had to, like, study  I thought there was a lot of information</p> <p>I tried to do, like, different</p> <p>I tried to do that  (If) I weren't to know a question  I'd have to look it up in the book</p>	<p>You have to know</p>	<p>They sent all revision lists out</p> <p>They gave, like, sample questions</p> <p>(Took a while to do all) them</p>
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Figure 5.28: Caoimhe's I poem on assessment in post-primary school [Interview 3]

This poem reveals the shift in Caoimhe's learning from exploratory to preparatory. The repeated "I" voice and the lack of any "we" voice highlights the solitary nature of her study process and how responsibility for success now felt heavily individualised. The line "I had to like, study" conveys the compulsory and unfamiliar nature of studying, suggesting that it had become a new norm. The volume of material that Caoimhe is expected to study is emphasised, "I thought there was a lot of information", indicating a sense of overwhelm. The transition from "I" to "you" in the line "You have to know" introduces a possible internalised version of the ideal learner, someone who is fully prepared, who knows everything before walking into the test. This "you" voice reflects pressure and expectation and perhaps reveals her developing internal script of what success in mathematics now demands.

Meanwhile, the "they" voice ("They sent all revision lists out" / "They gave, like, sample questions") highlight the approach to test preparation taken by Caoimhe's teacher. While they may have intended to help for the tests that lay ahead, they also introduced a more prescriptive and narrow way of learning and studying. It highlights that assessment was now a structuring force that shaped what learning looked like. This required a significant change for Caoimhe. Her previous focus on understanding had now appeared to shift to mastering prescribed content or questions now a key focus of her mathematics learning.

This plot continued to emerge across narratives in the fourth interview. The need for study intensified, as did her sense that mathematics was becoming more difficult. These developments brought heightened stress for Caoimhe. The I poem below (Figure 5.29) reflects her experience of a recent test where she struggled to finish within the time given.

<p>I think it's, like, harder  I have to, like, study more for it</p> <p>I did one of the things wrong  (It like took most of) my time  I kind of ran out of time  I didn't get it finished  I didn't know what to do  (That had never happened to) me before</p>	<p>We had a couple of, like, end of chapter exams</p>
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Figure 5.29: I poem on Caoimhe's view of assessment towards the end of first year [Interview 4]

The poem opens with a clear shift in perception, “I think it’s, like, harder,” signalling that the learning demands with mathematics had increased. The follow-on line, “I have to like study more for it,” reveals her attempt to adapt. The “we” voice briefly appears (“We had a couple of, like, end of chapter exams”), pointing to a somewhat shared experience with peers. However, the overall narrative is dominated by the “I” voice. This shift back to the personal perspective illustrates that, although these tests were experienced collectively, the emotional impact felt deeply individual. The sequence of “I” statements reflects a cascade of stress. One mistake Caoimhe made consumed valuable time, leading to a rushed and incomplete test. The admission “I didn’t get it finished” and “I didn’t know what to do” show the loss of control she felt in the moment. The final line of the poem (“That had never happened to me before”) emphasises how jarring the experience was for her.

In the final interview, Caoimhe reflected on how assessment had become an even more central part of her mathematics experience. They had grown in significance, now shaping both how she approached learning and how she evaluated success. The associated I poem (Figure 5.30), divided into three stanzas, captures this shift. The first stanza draws a stark contrast between her experiences in primary and post-primary school. In primary school tests were infrequent, “I didn’t really have tests in primary school,” with the use of the inclusion of the “we” voice suggesting a flexible and collective learning experience. This approach shifted significantly in post-primary school, as revealed in “(Now) I have tests”. The line “I kind of have to remember” again emphasises this new layer to her learning approach. It marks a move away from understanding concepts to a demand to retain information for assessment purposes.

The second stanza reflects a narrative shared by Caoimhe about a recent test. The poem reveals a mix of confidence and disappointment. Caoimhe deemed her preparation for the test as thorough, as can be seen by the lines, “I was studying from the end of chapter” and “I did all the example questions”. However, when she received her results, she was frustrated, “I did little things wrong” and “(Made a big difference then in) my result”. Caoimhe noticed that small

mistakes had a disproportionate impact on her final test score. Her disappointment highlights the high stakes she now associates with tests. However, the final stanza shows a more balanced tone, with a growing sense of control over her assessment performance. Statements such as, “I think better” and “I’m, like, better at studying and answering questions,” reveals that Caoimhe has adapted and has developed confidence in her approaches to studying. This section also reveals Caoimhe’s desire and motivation to want to do well in assessments. Her determination to avoid previous mistakes from First Year is evident, “I don’t want to be like, like stuck”. This marks a turning point in her mathematical identity, where she moves from uncertainty and frustration towards a renewed confidence in her ability.

<p>I remember in Sixth Class</p> <p>I don't really know I guess I didn't really have tests in primary school (Now) I have tests I kind of have to remember (What) I'm learning like now (In Sixth Class) I think it didn't really I wasn't going to be tested</p> <p>I was studying from the end of chapter I did all the example questions I thought I was going to do fine I got, like, my results back I did little things wrong I did the overall method right, but (Made a big difference then in) my result</p> <p>I'm really like I think better I'm, like, better at studying and answering questions I want to I don't want to like do bad I know (If) I'm in an exam I don't want to be, like, like, stuck I feel good about it</p>	<p>Our teacher would We just did, like, say twenty questions We didn't stay on the same topic for that long</p>
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Figure 5.30: Caoimhe's I poem on assessment in Second Year [Interview 5]

## Adjusting to learning mathematics in post-primary

*"I think it took me a while to get used to it all"*

The final interview with Caoimhe saw a strong re-emergence of her comfort and confidence in learning mathematics. After a difficult First Year, her narratives conveyed a greater sense of stability and adjustment. The I poem below (see Figure 5.31) captures this change, highlighting a more proactive and resilient approach to learning.

<p>I don't know  I think  I, like, try harder on my maths homework  (If) I didn't understand  I would ask my dad  (Last year) I would have kind of just, like, gave up  (This year) I like understand</p> <p>(If) I get it wrong  I just did an adding or calculation wrong  I don't find it hard to understand</p> <p>I think  I don't know  I find like the class, like, easier to understand  I know what we're doing this year</p> <p>I'm like paying attention more this year</p>	<p>(What) we're doing more in class</p> <p>We did it in class</p>
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Figure 5.31: Caoimhe's I poem on adjusting to learning mathematics in Second Year [Interview 5]

The poem opens with moments of hesitation, with the lines "I don't know" and "I think". However, the "I" voice quickly strengthens as Caoimhe reflects on her increased effort and responsibility: "I like try harder on my maths homework" and "I would ask my dad" indicate a shift toward more active engagement. These lines highlight a contrast with earlier experiences captured in the line "(last year) I would have kind of just like gave up." The "I" voice in this poem conveys a more persistent and self-directed learner who is now more willing to seek help and stay with a problem. As the poem progresses, the "I" voice continues to dominate, expressing a more settled relationship with mathematics. Rather than interpreting mistakes as failure, she reframes them as minor slips: "I just did an adding or calculation wrong". This is followed with a more confident assertion: "I don't find it hard to understand." This use of "I" marks a significant shift from earlier poems where the "I" voice was filled with self-doubt. Although the "we" voice appears briefly: "(what) we're doing more in class," the emphasis remains on her individual adjustment.

A further factor contributing to Caoimhe’s increased positivity towards mathematics in Second Year centred around the ways of working in her mathematics class. This was closely related to the organised note-taking approach now utilised. The I poem below (see Figure 5.32) captures her process of adapting to this new skill, which she links to feeling more in control. This was a notable contrast to the disorganisation she experienced in First Year.

<p>I think  I take, like, better notes  (Makes it easier for) me to look back  I had, like, three different copies last year  I kept on, like, ripping pages</p> <p>I just know more how to do it this year  I didn't do any of that in primary  I wasn't used to it</p>	<p>They just kept on looking messy</p>
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Figure 5.32: Caoimhe's I poem on adjusting to the ways of learning in post-primary school [Interview 5]

The poem begins with a tentative opening (“I think”) but quickly builds toward more confident assertions about her learning. The “I” voice dominates, expressing personal growth in how Caoimhe approaches studying: “I take like better notes” and “I just know more how to do it this year.” The line “(makes it easier for) me to look back” reflects a growing sense of agency she holds in being able to manage and support her mathematics learning. This marks a positive development in her mathematical identity journey. In contrast, the lines that followed offered insight into her experiences on First Year that were marked by disorganisation: “I had like, three different copies last year” and “I kept on like ripping pages.” The description of her notes as “messy” further underscores the confusion she felt when trying to adapt to unfamiliar routines. It reveals how difficulty Caoimhe experienced with basic classroom practices, such as note taking or organising materials, impacted her experience and sense of self as a learner. However, Caoimhe now feels more settled, both with the note-taking itself and the broader ways of working in post-primary mathematics.

Caoimhe attributed part of her improved experience to becoming more familiar with her teacher’s style and approaches. In Second Year, she had the same teacher as in First Year. While there was no evidence of significant change in the pedagogical approaches used, it appeared that with time, Caoimhe had become accustomed. She shared she was “used to how she works”. Initially, she found the teaching methods in First Year limiting and challenging to adapt to. However, with time, Caoimhe expressed a shift in confidence, noting, “I’m kind of like used to it, I think I’m like better.” This continuity supported Caoimhe in adjusting to her teacher’s style and fostered a more settled engagement with her mathematics learning.

## Looking back to primary school

*“I think it wasn't useless I guess, but, like, I didn't see it continue on in secondary”*

Over the course of the final three interviews, Caoimhe began to reflect more critically on her time in primary school. While earlier interviews had emphasised ease and enjoyment, these later narratives included observations about the repetitive nature of mathematics in the upper years of primary and a slower pace of learning. In her fourth interview, Caoimhe expressed some frustration at the lack of progress, especially when she felt ready to move on: “In primary school, we would like, - even if, like, half the class understood it, and, like, some of them didn't - we would still, like, stay on the topic for a while.” This perspective, not voiced earlier in the study, suggests a change in how Caoimhe now views her primary experiences. This reframing might be in light of the new demands and experiences she encountered in post-primary school.

In her final interview, when asked what advice she would give her Sixth Class self, Caoimhe expressed a sense of regret and highlighted a desire for stronger foundations. The poem below (see Figure 5.33) captures this reflection, particularly around some specific topics and word problems, which she finds especially challenging in post-primary school.

The first stanza focuses on self-directed reflection. “(Look over everything) I did” signals Caoimhe’s retrospective desire to have strengthened key areas of her learning before the move to post-primary school. She seems to regret missed opportunities for review in Sixth Class, particularly with topics like speed and working with word problems, which she now describes as “extra hard”. The “if” structure (“(If) I got everything in Sixth Class”) represents a hypothetical regret of sorts. Caoimhe believes that if she had a more secure foundation in Sixth Class that it would have made the adjustment to post-primary mathematics smoother. While her previous two interviews did not specifically reference learning gaps, with time, perhaps she realises that this may have contributed to the challenges she faced in First Year.

In the second half of the poem, Caoimhe reflects her peers. Lines like “They did different stuff” and “We weren't all on, like, the same level” suggest her awareness of differences between her own mathematical background and that of her new peers. The use of “they” marks her peers as a separate group, adding to a sense of separation. “We didn’t use it as much” and “I didn’t see it continue on in secondary” reflect her disappointment at the apparent lack of continuity between her mathematics learning in primary and post-primary school. Topics like long multiplication and division, once central, felt irrelevant in her new learning environment in post-primary. While she concedes “it wasn’t useless”, she is unsure of its value given the lack of visible links to First Year mathematics. This frustration signals that a smoother transition could

have been achieved if learning continuity was at a greater level. The presence of “we” voice suggests a shared experience of adjustment amongst her peers. The absence of any “you” voice reinforces this internal dialogue. It keeps her reflections focused on her own journey rather than generalising advice to others, possibly indicating a more settled mindset or confidence in her reflection.

<p>(Look over everything) I did          (If) I didn't get anything then          I never really got          I was really bad at like speed and kilometres and          word problems          (If) I got everything in Sixth Class          (First Year would have been a bit easier for) me          (A step up from things) I've already learned in sixth</p> <p>I'm like</p> <p>I didn't really know</p> <p>(With what) I did in sixth class          I just did like          I remember in Sixth Class</p> <p>I think it wasn't useless          I guess, but          I didn't see it continue on in secondary</p>	<p>They did different stuff          We weren't all on like, the same level</p> <p>We were learning          (It wasn't like) we just continued</p> <p>We just did loads of like, say like, long multiplication          and long division          (In First Year) we barely did any of that</p> <p>We didn't use it as much</p>
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Figure 5.33: Caoimhe's I poem looking back on her time in primary school [Interview 5]

### 5.3.4 Caoimhe's contrapuntal voices

Step three of the Listening Guide method focuses on identifying contrapuntal voices to explore how students negotiate their sense of self as mathematics learners across the transition. Caoimhe's interviews reveal a set of overlapping and evolving perspectives. What follows are three such voices that emerged strongly in her narrative: a voice of confidence, a voice of disconnection and uncertainty, and a voice of performance.

**5.3.4.1 Voice of confidence.** In her first interviews, Caoimhe's narratives reveal a strong voice of confidence in relation to her ability in mathematics learning. This voice is grounded in a

view of self as someone who quickly understands new concepts, often without needing much input from her teachers. Her early reflections show how she framed herself as a competent learner, someone who could “get it” before others. In her first interview, she explained, “I would get it first a lot and I’d get it right”, highlighting both speed and correctness as part of her mathematical identity. In a similar vein, she noted, “I just like picked that up, even though no one told me” (Interview 3), reinforcing the view that understanding often came naturally to her. This voice is also apparent in the way Caoimhe downplayed the difficulty of mathematics. She repeatedly stated that she didn’t “find it that hard,” using this phrase multiple times across her first two interviews. These statements signal ease with learning and became a recurring measure of her mathematical identity. For Caoimhe, feeling capable meant not needing extra help and not feeling stuck. This thread continued as she described her ability to mentally solve problems without needing to write them down: “I can do a lot of sums in my head” (Interview 1).

Peer comparison played a subtle but reinforcing role in shaping this voice. Caoimhe often contrasted her understanding with others in the class. When discussing classroom activities, she described moments when her peers struggled with concepts that she already understood, “people in our class would be saying like, oh, I don’t get this and I already got it” (Interview 3). These observations didn’t appear boastful, but rather served to reinforce her perception of being capable and in control. She also commented, “I was doing it quicker than everyone else” (Interview 1), also reinforcing her view that speed was a marker of success.

As Caoimhe moved into post-primary school, this voice remained present but began to shift slightly. In her third interview, she described her current experience as “fine” or “okay” and acknowledged that she didn’t find things as easy as before. Still, the voice persisted: “I don’t think it’s bad, things are kind of fine” (Interview 3). These more qualified comments signalled a shift from the assured confidence of earlier interviews to a more effortful and occasionally frustrated stance. In the fourth interview, she spoke about grappling with new methods and concepts. Notwithstanding this, she showed signs of adjusting, noting that she had “got used to” Algebra and was beginning to feel more settled. Rather than fading entirely, her confidence adapted to meet the demands of her new context. It also revealed a resilience that was increasingly playing a role in her mathematical identity. By the final interview, this voice had evolved into a quieter but steadier confidence, one grounded less in ease and speed but more in adaptation.

**5.3.4.2 Voice of doubt and disconnection.** As Caoimhe moved through the transition, a contrasting voice to her early confidence began to emerge. Marked by hesitation and a quiet

sense of withdrawal, this voice of disconnection and uncertainty began to surface more clearly from the third interview onward. However, even in her first interview, when asked if she is positive towards mathematics, she hesitantly replies, “Yeah, I think so”, hinting at a lack of conviction. In the same narrative, Caoimhe also shared, “It wasn't like my favourite subject, but it wasn't like a subject I hated”, indicating a certain ambivalence towards mathematics. These statements give a subtle impression that her relationship with mathematics is more complex than revealed through her voice of confidence. As she progressed into post-primary school, her descriptions of mathematics became more tentative and subdued. In her third interview, she offered lukewarm assessments of her learning, describing it as “okay” and avoiding more positive language that had once characterised her earlier reflections. While these statements may seem neutral on the surface, they suggest a diminishing sense of enthusiasm and a growing distance from the subject.

One of the clearest manifestations of this voice was her description of classroom learning in First Year. Rather than portraying mathematics as something engaging or rewarding, Caoimhe spoke about the experience in more passive and detached terms. “I wasn't really doing that much maths, I was doing like more writing” (Interview 3). The contrast here is important: whereas in primary school, she had spoken of learning in terms of understanding and challenge, here she positioned herself as a recipient of information, with limited opportunity for meaningful engagement. Her statement, “I don't really like, like that stuff,” further reflected her disengagement from this new way of learning. Uncertainty appeared throughout her narrative, especially when discussing unfamiliar topics or the transition to new learning approaches. This was particularly evident in her final two interviews, where she recalled confusion with topics and word problems, as well as frustration at having to re-learn methods in ways that felt unfamiliar and more complicated than what she had previously understood. “I don't really get it,” and “I like don't remember where we learned that” were common threads, pointing to an erosion in her sense of confidence.

This disconnection was not just cognitive but emotional. Caoimhe always tended to view mathematics as something that required an effort rather than being naturally engaging. When describing classroom life, she noted, “I was just kind of sitting there,” and at other points spoke about forgetting how to do previously learned content. Importantly, these moments didn't necessarily reflect a lack of effort but a shift in how she experienced her relationship with mathematics. It became less active, less connected and more uncertain. This contrapuntal voice sits in tension with her earlier voice of confidence. Even as she tried to maintain belief in her ability, her narratives reflected a distance from the learning and from the learner she once felt

herself to be. The voice highlights the emotional toll of the transition process and how new classroom norms and expectations can unsettle previously held understandings of self as a learner

**5.3.4.3 Voice of performance.** As Caoimhe progressed through post-primary school, a clear voice of performance emerged stronger in her narratives. While it was clear that assessment and performance had always mattered to her, the nature of that importance shifted in post-primary. This voice was not just about caring how she did in tests, it was about how the very meaning of success began to shift. Previously grounded in understanding and getting things “right” quickly, success then became tied to study and more regular tests. For Caoimhe, the transition introduced a new, performance-oriented definition of being “good at maths.” This had motivational and emotional consequences for her.

In the third interview, Caoimhe reflected on how preparing for her first test in post-primary school was a different kind of effort: “I had to like, study” and “I thought there was a lot of information.” She described having a lack of accessible support to help her prepare and so turned to the textbook. This shows a shift from understanding to deliberate, independent preparation, something that Caoimhe had not experienced before. The emotional cost of this new model of success becomes even more evident in the fourth interview, where she recounted a high-stress incident during a test: “I did one of the things wrong... it like took most of my time and then I kind of ran out of time... I didn’t get it finished... that had never happened to me before.” This appeared to disrupt Caoimhe’s mathematical identity as a capable learner. The pressure to perform in a time limited context began to threaten her confidence.

In her last interview, Caoimhe’s comments show that this voice had not disappeared but had been internalised and somewhat integrated into her identity. She described herself as being “better at studying and answering questions” and expressed a strong drive to perform well: “I don't want to like do bad... if I'm in an exam, I don't want to be like stuck and not know how to answer questions.” She also mentioned doing “more study” than before for a recent test and felt “fine studying for it now”. These statements suggest that Caoimhe has built a greater comfort with the demands of post-primary mathematics. It appears this is as a result of an acceptance and adjustment of the new demands as opposed to them subsiding. Importantly, this voice is not only self-imposed. In the final interview, she made a striking comment about classmates in the highest stream being “under like, lots of pressure,” as their teacher warned they might be moved down if they performed poorly. This structure and classroom culture amplified performance pressure, embedding it deeper into how students, like Caoimhe, saw themselves.

The voice marks an evolution in Caoimhe's mathematical identity. It acts as a constraint and, in a way, a motivator, driving her to engage more deeply with study, while also introducing a fragility to her confidence.

**5.3.4.4 Interplay between voices.** The interplay between Caoimhe's voices provided an insight into the evolving nature of her mathematical identity. Initially, her voice of confidence dominated. Caoimhe's ease with understanding and her comparisons with peers helped construct a self-image as a competent mathematics learner. However, this self-assured narrative became frequently interrupted by her voice of doubt and disconnection as Caoimhe reached the end of Sixth Class and entered First Year. This was reflected in the subtle, yet significant, hesitations in her responses. As she encountered new concepts and new approaches to learning this voice gained ground. This indicates that her confidence is somewhat conditional and often accompanied by self-questioning, especially when faced with new challenges.

As Caoimhe's journey across the transition progressed, her voice of performance changed and grew in volume. It did not replace the other voices but reshaped them. Confidence became conditional, and was no longer tied just to understanding. The role of assessment proved increasingly powerful, with test results and improved approaches to study providing Caoimhe's voice of confidence with necessary firepower. Her voice of doubt deepened at times, particularly in First Year, when small errors led to significant consequences. However, as time went on adaptation also became more visible. With adjustment, Caoimhe began to reclaim some agency as she became accustomed to the structures and expectations of life in post-primary school. The voices reflect Caoimhe's negotiation of her mathematical identity. They reveal how emotional and institutional factors all played a part in shaping how Caoimhe came to see herself as a mathematics learner.

### **5.3.5 Summary**

Caoimhe's journey offers a powerful illustration of the shifting nature of mathematical identity during the transition from primary to post-primary. Her case highlights how identity is negotiated through the interplay of emotions, classroom practices, assessment structures and teacher relationships. Early on, Caoimhe positioned herself as a capable learner and someone who grasped concepts quickly. Yet this voice was increasingly tempered by moments of doubt and frustration as she encountered new pedagogies, rigid methods and the weight of assessment in First Year. The impact of the structures of her post-primary school became particularly evident through the emergence of performance as a dominant theme. The shift from learning for understanding to learning for tests reshaped how Caoimhe evaluated herself. At the

same time, her adaptability, seen in her study habits and gradual adjustment to classroom routines, revealed a form of mathematical identity grounded in pragmatism. Across her interviews, what emerges is a learner navigating the demands of a new environment. She actively questioned and negotiated her sense of self through confidence, struggle, failure and eventual adjustment.

## 5.4 Saoirse's mathematical identity

### 5.4.1 Initial researcher response

Saoirse presented as a student who was often very open and aware about her experiences with mathematics. Her journey through primary mathematics was marked by both fluctuations and recoveries in confidence, often tied to changes in teaching style and topic difficulty. While certain years, such as third and fifth class, were more challenging, she also recalled many enjoyable and motivating experiences, particularly when learning was made engaging and accessible.

Early in our interviews, she emphasised speed and accuracy as key indicators of mathematical success. This emphasis on getting things right quickly appeared to have formed early in her primary school experience and seemed firmly embedded in her views of what good mathematics learning should look like. Using this criteria, Saoirse frequently compared herself to others. It seemed like her view of self was regularly tied to how she measured up against her peers. It left me wondering where this inherent comparison came from. Did it originate from exposure to competitive classroom environments in primary school? I found myself questioning how difficult would it be for Saoirse to shift away from these rigid ideas of success and comparison as she moved into post-primary school.

Saoirse repeatedly pointed to the importance of her teachers. She was particularly sensitive to changes in classroom structure, and the approaches used by her teachers. A slight change appeared to unsettle her confidence. The shift to post-primary school brought about lots of uncertainty. This seemed to centre around Algebra and also around social dynamics and assessment expectations. Something that really stood out to me was self-conscious she appeared in asking for support, something that would be worth exploring further. Assessment seemed very present throughout and appeared to bring on anxiety, particularly as the prospect of being placed into higher- or ordinary-level maths classes at the end of First Year.

Saoirse's reflections on her teachers also stood out. She seemed to consistently link her understanding to the effectiveness of her teachers' explanations. I was curious about how the transition to post-primary school, where she had many new teachers initially, affected her sense of competency. From her interviews, the disruption in First Year appeared to have been challenging. I wondered if this disruption contributed to the shift in tone I noticed in her later interviews? As she moved through First Year, Saoirse's relationship with mathematics seemed to be on a knife edge, especially around Algebra. From early days, she anticipated Algebra to be

difficult before she even started the topic. Other people played a significant role here, from her teachers, peers and family all indicating that it was going to be challenging. This foreboding may have created a type of self-fulfilling prophecy, contributing to her struggles once she actually encountered the topic.

Mathematics seemed to have slid down her preference list of subjects. This appeared to have happened between the third and fourth interviews, something that would need to be investigated further. One of the stand out moments when listening to all her interviews was how she could genuinely not provide me with something positive about learning mathematics during the fourth interview. This was a surprise and a concern. In the last interview, Saoirse began to find firmer ground, as she showed clear signs of adaptation. Her PJG (Figure 5.34) echoed this point. While having a bump in her score at the start of First Year, the double drop at the end pointed to difficulties.

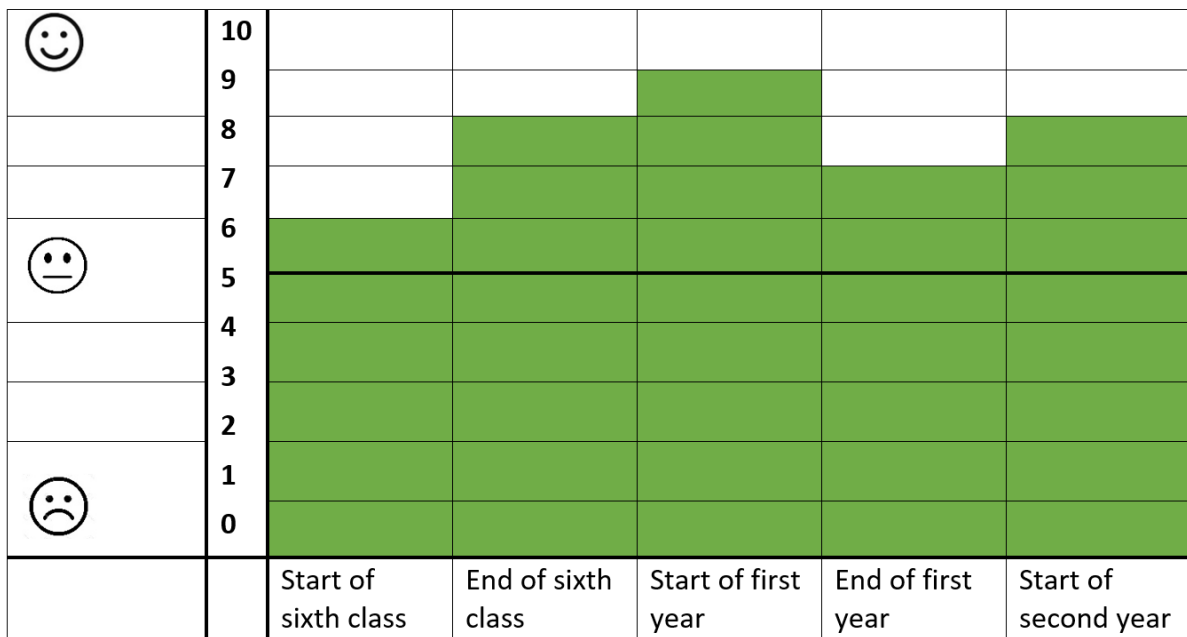


Figure 5.34: Saoirse's PJG across the transition from primary to post-primary

#### 5.4.2 Saoirse's life story with mathematics

*"I wouldn't be the best at it, but I'm okay at it"*

A key part of the first interview with Saoirse involved exploring her life story with mathematics. Her earliest memories stemmed from Senior Infants, where she recalled that mathematics was fun and engaging. This positive experience continued through to Second Class, as she reflected, "From Junior Infants to Second Class, I didn't really think too much about it, because it was always fun." However, a shift occurred in Third Class, which marked a turning point in how she viewed the subject. She recalled that mathematics began to feel more serious:

“When I got into third, it started to get a bit more serious and you had to like tests and all, it wasn't as fun”. Specifically, she highlighted learning multiplication and division as being hard for her, even finding multiplication “scary” at first. She rated her experience that year with a lower score than previous years, explaining that she often felt “fed up going in to do maths,” as it had become “more serious”, “less fun” and involving “more tests.”

A second key moment in her mathematical journey occurred during the COVID-related school closures. During this time Saoirse struggled with online learning, she claimed mathematics was “the hardest subject” to learn remotely. One key memory she shared centred around her struggles with completing exercises from a mathematics textbook. Saoirse recounted the name of the text book and the topic at hand, as she described how “ it used to take ages and I remember one page I did and it took me at least an hour and a half, it was so long”. This period appears to have negatively impacted her confidence in mathematics, making Fifth Class more of a struggle. She explained, “In Fifth Class, I didn’t even want to be in the maths classroom anymore”. However, when talking about Sixth Class, a more positive tone returned. Her relationship with mathematics began to recover, a shift reflected in the upward movement on her PJG (see Figure 5.35).

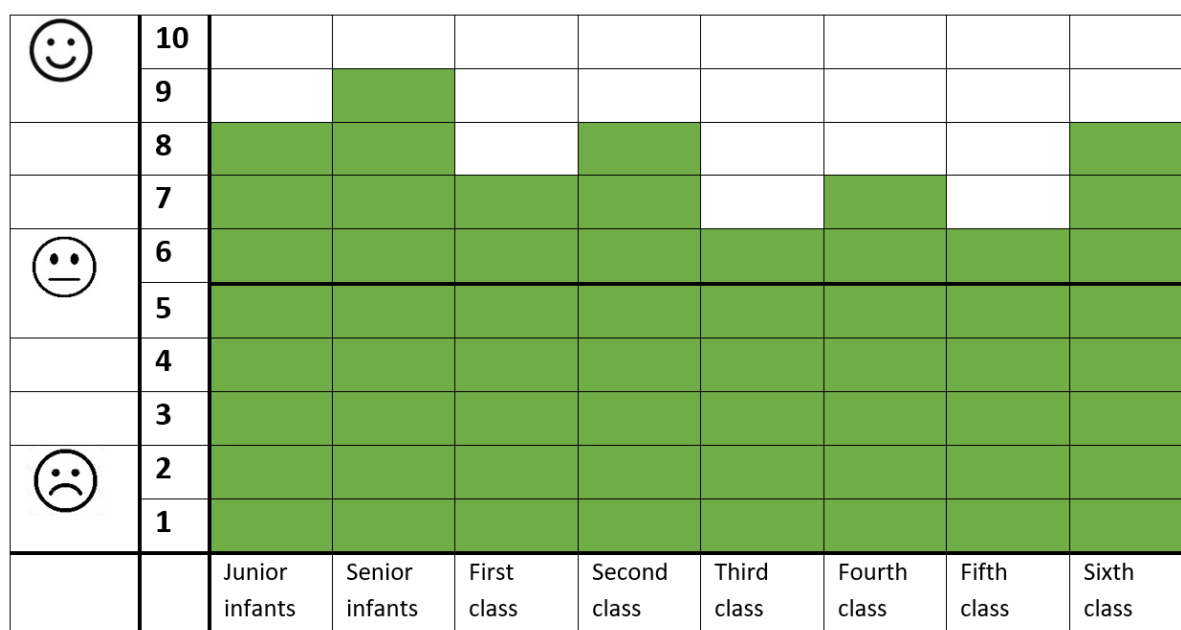


Figure 5.35: Saoirse’s mathematics PJG across her years in primary school

#### 5.4.3 Saoirse’s identity across the transition from primary to post-primary

##### Learning mathematics in Sixth Class

*“It stayed the same but it just got a lot easier to understand”*

In her first two interviews, Saoirse reflected on her experiences of learning mathematics in Sixth Class. Early in the first interview, she discussed the topic she was currently working on, Profit and Loss. While she described it as “quite hard” and sometimes “confusing” her overall tone is positive. She used words like “more fun” and “excited” to describe her feelings about mathematics, marking a shift from the frustrations she experienced in Fifth Class. A key theme across her narrative in Sixth Class was how mathematics had become easier to understand. Reflecting on the difference between Fifth and Sixth Class, she noted that while the learning generally “stayed the same” it had “got easier to understand.” This comment reflected a growing confidence in her ability to engage with mathematical learning. Despite this progress, Saoirse remained realistic in her assessment of mathematics, stating plainly: “it’s not my favourite subject, but it’s okay”.

As she finished in Sixth Class, Saoirse described her mathematics learning experiences as “fun”, involving outdoor learning and working with her peers to solve problems and puzzles. The period at the end of Sixth Class also featured significant revision of topics that centred around the use of the mathematics textbook. Indeed, the mathematics textbook is mentioned a number of times and appears to form a significant role in her learning. Saoirse highlighted a somewhat functional viewpoint of the textbook, in how it acted as a resource that was sometimes useful to explain concepts. She explained that the textbook offered a useful backup if she struggled to understand the explanations provided by her teacher.

### **What success with learning mathematics looks like**

*“There’s loads of people finished before me”*

In the first interview, Saoirse’s idea of what constitutes success in mathematics learning emerged clearly. When asked about her enjoyment of mathematics and her views of herself as a mathematics learner, two key measures stood out as significant. Firstly, she placed significant weight on the speed of mathematics learning, viewing those who finish tasks quickly as more successful. She commented, “There’s loads of people finished before me and I would be finished in the middle,” suggesting that speed acts as a benchmark against which she gauges her own ability. Secondly, Saoirse emphasised the importance of getting “sums right”. Reflecting on her own experience, she shared how “she gets stuck on questions” that others did not. She mentioned how she can find “sums” hard during class, with this appearing to confound a view she holds of herself as a mathematics learner, as someone who is “in the middle”. Comparisons with her peers feature prominently and reinforced a somewhat rigid view of what it means to be good at mathematics.

### **Strong influence of teacher**

*“some teachers are better at explaining than others”*

Throughout her first and subsequent interviews, Saoirse consistently emphasised the strong influence her teacher had on her experiences of learning mathematics. Reflecting on her time in Sixth Class, she spoke with confidence and warmth about her teacher, describing how they “make it a lot easier for us” and are “explaining it more easily and it’s making a big difference”. For Saoirse, the teacher’s effectiveness was linked to both the clarity of explanation and how they made the subject more engaging through the learning experiences they provided.

A major turning point for her was the contrast she drew between her Fifth and Sixth Class teachers. In Fifth Class, she recalled struggling with certain mathematical concepts, especially long division, explaining that her teacher “used to explain it in a way that was hard to understand”. In Sixth Class, however, she described how she was “learning easier ways of, like, doing stuff” and gave the example of long division, a topic she had previously found difficult but now found “really easy” thanks to a clearer, more accessible approach. The shift in teaching style not only improved her understanding but also her confidence, reinforcing the central role the teacher played in shaping her mathematical experiences and outlook.

### **Looking ahead to post-primary school**

*“I’d say it will be a bigger step up”*

In her first two interviews, Saoirse elaborated on her feelings about the move to post-primary school. She was reassured that learning she encountered in Sixth Class would act as good preparation for First Year. She also anticipated that the upcoming move would involve a significant step up and noted that “it will probably be a bit harder” than learning mathematics in primary school. On a number of occasions, Saoirse mentioned how she was looking forward to using the calculator more in post-primary. During her time in primary school, calculator use had been restricted, so gaining access to them in post-primary was framed as a positive: “It’ll be easy because you can use some calculators.” This gave her a small source of confidence as she considered the move.

During the second interview, and as the move itself neared, Saoirse began to express more overt concern that learning mathematics would get harder in post-primary school. For the first time, she admitted to feeling nervous about the move, specifically in relation to mathematics. While she maintained that she felt broadly prepared, a clear note of hesitancy ran through her narrative. Saoirse’s initial view that learning mathematics would be a “bit harder”

shifted into it will “probably be a lot harder”. When probed as to why she feels this way, she responds “It’ll be harder because it’s in secondary school.” She followed up by saying that her Sixth Class teacher had told her and her peers that learning mathematics will get harder in post-primary, but that they will all adjust after a while. Her brother also contributed to her expectations, warning her about an increase in difficulty and in mathematics homework, something she is not looking forward to.

The I poem below (Figure 5.36) captures this blend of apprehension and cautious hope, as she imagined what post-primary mathematics might be like based on what others had told her.

<p>I’m a bit nervous I think I am</p> <p>I don’t want</p>	<p>You get to use a calculator</p> <p>You go from fifth to sixth You won’t really notice</p> <p>You get</p>	<p>They spend a lot more time</p>
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Figure 5.36: I poem capturing Saoirse’s views on looking ahead to learning mathematics in post-primary school [Interview 2]

The poem is deeply personal, expressing Saoirse’s vulnerability and nervousness about the transition. Phrases like “I think” and “I’m a bit nervous” reflect her uncertainty about what lies ahead for her mathematics learning. The “you” voice introduces an idealised, external perspective, what she has been told by others to expect. In this voice, she tries to find reassurance, as seen in “you get to use a calculator.” This implies that she is trying to find a positive aspect amidst her worries, but it also suggests that this reassurance is external and perhaps not coming from within herself. Finally, the “they” voice is somewhat detached. “They spend a lot more time,” reflects something she has heard about post-primary school but does not personally relate to yet. The shifts between voices highlight the complexity of Saoirse’s emotional landscape as she anticipates the move.

### A tumultuous start to post-primary

*“At the start I didn’t want to do it”*

Saoirse was very forthcoming in describing how her initial experience with mathematics in her new school was not a positive one. In the first few weeks, she found mathematics boring, confusing and difficult to understand. She also expressed dissatisfaction with the number of different mathematics teachers she had encountered since the start of the school year, an issue explored in a later section. During this early period, Saoirse admitted that she “didn’t want to go in” to the mathematics classroom. However, by the time of the third interview, almost three months into First Year, she shared a more hopeful outlook. She explained that she had become more accustomed to the new learning environment and was beginning to find learning easier to understand. This shift is captured in the following I poem (Figure 5.37) which traces her journey across those early months.

<p>I found sets easy</p> <p>I’ll get them I’m not like struggling</p> <p>I didn’t want to do it I didn’t want to go in</p>	<p>You got the hang of it</p>	<p>We’re on integers now</p> <p>We never did We saw the rules We kind of got it We didn’t do</p> <p>We got past We got into We got used to We weren’t too bad We didn’t really mind</p>
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Figure 5.37: I poem representing Saoirse’s journey over the first few months of learning mathematics in post-primary school [Interview 3]

The poem traces back through the stumbling blocks Saoirse faced. It opens with the collective “we” voice, as Saoirse describes how she and her classmates encountered unfamiliar topics like Integers. She distinguishes between topics, noting “I found Sets easy” and “I’ll get them,” signalling moments of personal confidence. Despite moments of confidence, phrases like “I’m not like struggling” carry a tentative tone, as if she is working to convince herself. This suggests that even as she gained understanding, uncertainty remained. The appearance of the “you” voice, “You got the hang of it”, adds a more generalised, possibly optimistic framing. It may indicate that mastery or understanding feels achievable. Yet the return to “I” in “I didn’t want to do it” and “I didn’t want to go in” brings us back to the emotional core of Saoirse’s early struggle. These lines emphasise her reluctance and initial resistance, highlighting how the transition disrupted her sense of comfort.

As the poem progresses, the significant dominance of the “we” voice reflects a sense of solidarity and shared experience with her peers. The final five lines suggest a gradual overcoming of initial challenges associated with unfamiliar material. They signal that even with some early turbulence, Saoirse and her classmates eventually found their footing. The shift from the isolating “I” to the inclusive “we” highlights how Saoirse drew comfort from navigating this change alongside others.

### **A positive peak**

*“I feel kind of happy about maths”*

Having described the turbulence of her first couple of months in post-primary school, Saoirse’s outlook by the time of the third interview was far more settled. Her description of learning mathematics at this point was marked by growing understanding and a noticeable increase in motivation. The I poem below (see Figure 5.38) reflects this shift, revealing how her adjustment began to positively influence her overall relationship with the subject.

I’m starting to understand
I don’t
I feel a bit better
I always try
I found
I was finding
I feel
I understand it
I understand things better
I did
I feel better

*Figure 5.38: I poem portraying Saoirse’s current feelings towards learning mathematics following three months in post-primary school [Interview 3]*

The poem begins with “I’m starting to understand,” which signals a turning point for Saoirse’s learning. It suggests that although she may not yet feel fully confident, she is now able to see progress, which has a positive impact. This is reinforced by the repetition of “I understand” and “I feel better,” which point to a growing sense of mastery and emotional satisfaction. These phrases suggest that as Saoirse’s understanding of mathematics deepens, she feels more motivated to engage with learning. The line “I feel kind of happy about maths” marks a significant emotional turning point, signalling that understanding has not only improved her performance but also her enjoyment. The lines “I always try” and “I was finding” reflect a perseverance and further emphasise that her efforts in the subject are being rewarded. By the

end of the poem, phrases like “I feel better” and “I understand things better” show that her initial discomfort with mathematics has given way to a more positive, settled state.

This shift is also evident in her broader commentary. Comparing mathematics to other subjects, she shared, “Maths would probably be in one of the top, like, ones.” Buoyed by her recent Christmas test result, she added, “I’m actually kind of liking maths now.” These sentiments are mirrored in her PJG (Figure 5.34), where she gave mathematics a score of nine, her highest rating across the transition. Justifying her score, she explained, “I’m starting to understand and it’s getting a lot easier and bits.” Looking back on the preceding months, Saoirse concluded, “Every month that goes by, I feel a bit better about it.” This upward trajectory suggests that the challenges she faced early in First Year, while significant, were not insurmountable. As she moved past the first couple of months, Saoirse’s mathematical relationship with mathematics was in a positive place.

### **Mathematics learning experiences in post-primary**

*“We take lots of notes”*

In describing her mathematics learning during the early months of post-primary school, Saoirse made repeated references to specific topics, chapters, tests and the mathematics textbook. When asked to describe a typical mathematics lesson, she described a shared routine that is captured in the I poem below (see Figure 5.39).

We kind of just go in We take out our books We could be writing down notes We could be doing exercises We haven’t We used We just took We corrected We ever used
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*Figure 5.39: I poem on Saoirse’s learning experiences in post-primary school [Interview 3]*

The poem reflects a communal experience of learning mathematics, with the “we” voice used throughout to describe the classroom environment. Unlike earlier poems in which the “I” voice featured prominently, this poem depicts a more structured, collective routine. Phrases like “We kind of just go in” and “We take out our books” convey a sense of predictability and routine. The references to textbooks and exercises reveal experiences heavily focused on note taking and using the textbook, as she highlights how her class “could be writing down notes for

the day” or working on exercises or computations from her textbook. She noted that the only additional resources used in First Year were calculators and, on one occasion, mobile phones to correct a class assessment. Her narrative suggests a heavy focus on procedural and passive learning.

When asked to compare this experience with her learning in Sixth Class, Saoirse recalled using “different kinds of stuff like dice and cards”, pointing to the more hands-on approaches. While Saoirse notes the difference in learning experience, she does not portray a sense of yearning for the physical manipulatives she used in primary school. The absence of the “I” voice in the poem above suggests a detachment from the learning process. Her tone throughout implied acceptance of the new structure and is content to adapt to the new ways of learning.

In her final interview, Saoirse offered a retrospective view on her First Year learning experiences. She contrasted them with Second Year by stating, “Like last year, we took no notes and just kind of opened the book and did the questions.” Interestingly, this more critical reflection did not arise during her previous two interviews, when she was in the midst of those experiences. This change suggests that her perspective on learning in First Year evolved as she encountered different learning experiences in Second Year.

### **Increased emphasis on assessment**

*“it's like test after test”*

In the lead-up to the move to post-primary school, Saoirse’s only reference to assessment related to the standardised test completed at the end of Sixth Class. Reiterating her belief that mathematics is not her “best subject”, she noted that across the standardised tests she had taken, mathematics was the most difficult. When asked about her experience with these assessments, Saoirse admitted she often felt “nervous at the start”, largely due to a fear that “they’ll be really hard.” Despite this, she expressed overall satisfaction with her last one in Sixth Class.

At the time of the third interview, Saoirse had just completed another recent assessment, this time her winter mathematics test, with her results arriving the previous day to the interview. The I poem (see Figure 5.40) reveals her reaction to the test result, as well as the also the pressures of that accompany assessment in her new school.

<p>I feel kind of happy</p> <p>I got eighty percent I got my highest result I started in secondary school</p> <p>I just flick through that a bit I don't find</p>	<p>You would have to study You didn't like understand You would have to go back over it</p>	<p>We got our Christmas assessments</p> <p>We get a test on nearly every chapter</p> <p>We have notes in our notes copy</p> <p>We get a test on every chapter</p>
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Figure 5.40: I poem describing Saoirse's experience of assessment [Interview 3]

The poem opens with a note of celebration: "I feel kind of happy" followed by "I got eighty percent" and "I got my highest result". These lines reflect a sense of achievement and also highlight how deeply Saoirse values the validation from these test scores. Her emphasis on her high score emphasises how central assessment results are to how she measures her progress and views her mathematical ability. However, there is a noticeable shift when the poem introduces the "you" voice. The lines, "You would have to study" and "You didn't like understand" signal a move from personal reflection to internalised expectations. The "you" voice seems to set a standard of how one should ideally approach tests, by studying thoroughly and revisiting material. This introduces a sense of pressure Saoirse feels she must meet. Finally, the introduction of the "we" voice shifts from the personal to the collective experience. "We get a test on nearly every chapter" suggest a more factual recounting of classroom practices, experienced by her and her peers. The "we" voice is used to describe the standardised rhythms of classroom life. Additionally, the line "We have notes in our notes copy" suggests a shift toward more structured preparation. Overall, Saoirse's tone here was one of ease and acceptance, as she became accustomed to the expectations of post-primary school.

Across the interviews, Saoirse consistently places significant emphasis on assessments and their outcomes. The frequency of assessment in post-primary school, however, has become a source of pressure. This is perhaps best captured in her own words, when asked what had surprised her most about mathematics in post-primary: "It's just the test every chapter and there's no break, it's like test after test." This comment captures how assessment has become a

dominant structure in Saoirse's mathematical learning, shaping both how she learns and how she feels about the subject.

### **Arrival of Algebra**

*"I think it's hard at the minute now because we're doing Algebra"*

Saoirse's first reference to Algebra arose in her third interview, when asked what she was not looking forward to for the remainder of First Year. She explained, "everyone, like, my older brothers and things would be saying stuff about Algebra and it's supposed to be hard," reflecting a sense of anticipatory dread based on what she heard from others. This apprehension became more tangible in the fourth interview, where Saoirse's description of mathematics centred on her struggle with Algebra. The I poem constructed from this interview (see Figure 5.41) provides a window into how Saoirse positioned herself in relation to this area. The poem communicates a cognitive difficulty and also a sense of emotional resistance.

The poem opens in the first person: "I think it's hard," immediately foregrounding her personal struggle. As it unfolds, the pronouns shift. The emergence of the "we" voice ("We're doing Algebra"/ "We had a test"/ "We didn't") suggests a move from an individual to collective experience. Algebra becomes a shared challenge, something her entire class is grappling with. This collective framing may offer a sense of solidarity, but it also diffuses it as an individual responsibility or problem for her. Despite this shared experience, the tone remains negative, reflecting the challenges that Algebra presents for Saoirse and her peers. The reappearance of the "I" voice ("I don't want"/ "I don't like") reasserts Saoirse's personal disaffection. These statements convey a clear disengagement and reluctance, revealing how Algebra has become associated with frustration and has dampened her enthusiasm for mathematics learning. The emotional tone here is more stark than earlier in the poem, suggesting that the cumulative impact of difficulty has begun to wear down her motivation. Intriguingly, there is a single reference to the "you" voice: "(Show) you how to do it." Delivered in a somewhat frustrated tone, Saoirse is signalling an external pressure to understand. In the busy classroom, she gets shown how to complete particular tasks in a direct way if she does not understand it initially herself. Indeed, in justifying her overall score provided for the end of First Year on her PJG (see Figure 5.34), Saoirse attributes her learning experience with Algebra as the reason why it has dropped from a nine to a seven.

<p>I think it's hard</p>          <p>I don't want I don't like</p>	          <p>(Show) you how to do it</p>	<p>We're doing Algebra Our first time We had a test We didn't We might have We're doing now</p>
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Figure 5.41: I poem representing Saoirse's experience of learning Algebra in First Year [Interview 4]

### Assessments get harder

*"I lost marks"*

As Saoirse progressed through First Year, her fourth interview revealed a growing concern about assessment, particularly following a recent test on Algebra. She described the assessment as very difficult. At the time of the interview, she had not yet received her results but was already anticipating disappointment. Recounting several mistakes she believed she had made, Saoirse expressed frustration that small errors would cost her significant marks. The I poem below (see Figure 5.42) captures Saoirse's reflective processing of this experience.

The poem's opening line ("I knew how") suggests an initial sense of confidence. However, this is short-lived. The immediate shift to "I might leave out", "I forgot" and "I lost marks" portrays a rapid unravelling, as Saoirse moves from knowing to forgetting. These lines reflect the fragility of Saoirse's mathematical confidence, where isolated errors come to dominate her view of the test. The line "I only realised now" adds a temporal dimension to this reflection, suggesting that her awareness of the mistakes emerged only after the test was completed. This belated understanding appears to compound her frustration, as she is unable to correct the outcome and must instead sit with the consequences. Her focus on the marks lost, rather than knowledge or understanding gained, underscores how closely Saoirse equates mathematical learning with assessment performance. The line "I did" and "I'd rather" signal a retreat and an attempt to distance herself from the discomfort of the whole experience. The poem reflects a critical moment where her mathematical identity is at risk of becoming defined by these small setbacks.

I knew how
I might leave out
I forgot
I lost marks
I only realised now
I know
I did
I'd rather

Figure 5.42: Saoirse's I poem describing her recent test [Interview 4]

As she came towards the end of First Year, with a summer assessment on the horizon, there was a sense from Saoirse that she felt she had much preparation to do. She expressed anxiety that Algebra, a topic she continued to struggle with, would feature prominently. Her worry about this upcoming test mirrored the broader tone of apprehension she conveyed about mathematics learning during this period.

In her final interview, Saoirse described how she prepared for mathematics assessments. Studying her notes and completing practice questions had become central to her approach. She also highlighted how important having good notes had become to her, saying, "you need them for studying for tests." The role of the teacher emerged as significant in this regard. Unlike in First Year, her current teacher prioritised ensuring that the class maintained clear and organised notes on each topic. This provided Saoirse with reassurance, offering her a sense of control and structure in the lead up to tests. Reflecting on a recent mathematics test, she remarked that "it included more things and I found I had a lot more to study for". While this suggested an increased workload, it also portrayed Saoirse been more aware of the preparation she needs to do ahead of such assessment events.

### Peer comparisons

*"they'll always be getting very high scores"*

As Saoirse reflected on her experiences in the second half of First Year, she began to articulate the impact of peer comparison in mathematics, particularly in relation to assessment results. The I poem that follows (see Figure 5.43) highlights how these comparisons increasingly shaped Saoirse's mathematical identity. Of note, Saoirse comes across as somewhat downbeat in this narrative, as reflected in her tone of voice. Peer comparisons are not welcomed by Saoirse, who feels it happens more in mathematics than other areas.

<p>You don't want You don't know</p>   <p>You might have gotten maybe in the sixties</p>	<p>They'll always be getting very high scores They struggle They'd be saying, 'I got'</p>
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Figure 5.43: I poem representing comparisons made around test scores [Interview 4]

Notably, the predominant use of the “they” and “you” voices in this poem marks a shift from Saoirse’s usual focus on her personal experience, suggesting a growing awareness of how her performance in mathematics is viewed in relation to her peers. The “they” voice introduces a perceived divide between those who consistently perform well, “They’ll always be getting very high scores,” and others who, like Saoirse, may feel less secure in their abilities, “They struggle.” These lines underscore a competitive classroom culture where success is highly visible and often vocalised, as captured in “They’d be saying, ‘I got’”. This sharing of scores in this way makes it difficult for Saoirse to ignore the gap between her and her peers. These moments appear to deepen a sense of separation, as though she exists outside the high-achieving group. The use of “you” intensifies this sense of this distance. Phrases like “You might have gotten maybe in the sixties” and “You don’t want” hint at discomfort and reluctance to engage with these comparisons. Here, the “you” voice may function as a distancing mechanism and a way for Saoirse to reflect on her own experience while softening its personal impact. On the other hand, it could reflect a more generalised voice of the struggling student, suggesting that her experience is not isolated. Finally, and of note, this poem sees a move away from the “we” voice. This shift reflects a subtle but important change in how Saoirse narrates her mathematical identity, no longer through a shared experience, but in relation to others whose performance feels increasingly distinct from her own.

### **A revolving door of teachers**

*“then you go to another teacher, and they'd recommend you do it another way”*

As highlighted in her early interviews, Saoirse placed strong emphasis on the role her teacher plays in shaping her mathematics learning. It was perhaps unsurprising, then, that in her third interview she described a period of disruption that involved having a number of different mathematics teachers across her first three months of First Year. She deemed it to be her most significant challenge so far relating to her mathematics learning. This revolving door of substitute teachers had a clearly negative impact on her experience. Saoirse described how “they were all kind of telling us different things” which “made learning more confusing”. These

inconsistencies contributed to a sense of instability for Saoirse and a loss of trust in the learning process. In the weeks leading up to her third interview, Saoirse noted, with relief, that they had finally had the same teacher for a few weeks. This continuity was welcomed by her and her peers. She described the teacher as approachable and good at explaining learning. This consistency appeared to have an impact on Saoirse’s views of mathematic learning, with a noted positive and content tone observed as she spoke about the teacher.

By the fourth interview, Saoirse was still being taught by the same teacher and maintained a generally positive view. However, with the arrival of Algebra, a particularly difficult topic for her, she seemed to look for additional support. Lowering her voice, Saoirse described how she felt the teacher can get frustrated when asked to explain particular learning time and again, “the teacher is kind of getting frustrated with you that you don't know much.” These frustrations appear to have a noted impact on Saoirse’s feelings. While she welcomed the consistency in teaching, she still felt emotionally isolated when her learning needs were not met with patience. When asked again to reflect on the biggest challenge of First Year during this interview, she again chose to select the disruption from the beginning of the year. The short I poem below (see Figure 5.44) shows Saoirse’s experience of this time.

You had loads of different teachers You might have to learn it another way You would have taught a question You go to another teacher You do it another way You’re kind of just	          We do it
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*Figure 5.44: I poem representing Saoirse’s experience of having a number of different mathematics teachers in First Year [Interview 4]*

The poem highlights Saoirse’s frustration with being taught in inconsistent ways. Instead of welcoming the idea of multiple solution strategies and different ways to deepen her understanding, Saoirse found these “frustrating” and “confusing.” She craved clarity and continuity in her teachers. The “you” voice represents an element of detachment, as though Saoirse is describing someone else’s experience, yet it simultaneously reflects her own disorientation. This generalised framing may be a way of softening the personal impact of the instability she experienced. She does not anchor the experience in the personal “I” voice but instead speaks from a removed position. The whole experience seems to impact her confidence and mastery with her mathematics learning. The final line “We do it” shifts briefly into a collective voice, indicating that this disorientation was shared among her peers.

In her final interview, Saoirse reflected on her experience with a new mathematics teacher in Second Year. She was enthusiastic in her praise, describing the teacher as “just nicer to us and explains it much better.” She noted that the new teacher was more organised, particularly in how learning was structured and presented. Saoirse highlighted positive changes in classroom practice, including a stronger emphasis on note-taking and working through more examples, strategies she explicitly welcomed. The way in which her teacher prioritised clarity and supportive interactions has provided Saoirse with a stable footing to go forward.

### Splitting the mathematics class

*“people that’d be more better at it will be together in one class”*

At the end of the fourth interview, as Saoirse was looking ahead to Second Year, she mentions an upcoming split that will happen with her mathematics class. The I poem that follows (see Figure 5.45) reveals the uncertainty Saoirse felt about this process and its implications.

<p>I don't really know  I know  I think  I don't really know</p> <p>I think it's the start of second year  I don't really mind  I don't want  I don't want  I don't know  I think</p>	<p>We will be like split</p> <p>We just got told that one day</p>
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Figure 5.45: I poem on the upcoming split of Saoirse’s mathematics class [Interview 4]

The poem has a notable shift between the “we” and “I” voices. It begins in the collective: “We will be like split,” suggesting that this change affects the whole class. As the poem unfolds, the dominant voice shifts to “I” indicating that while the change is shared, the emotional weight lands squarely with her. The line “I don’t want” point to personal unease, while the lines “I think”, “I don’t know” and “I don’t really know” highlight her uncertainty. The second “we” line (“We just got told that one day”) reinforces the abruptness and lack of control surrounding the decision. These poem reflects a disrupted sense of stability with Saoirse unsure how decisions will be made or what the split will mean for her learning journey.

The uncertainty surrounding the move is compounded by the lack of clear communication from her teacher. According to Saoirse, the teacher mentioned once that the class would be divided but provided no further details. This created a sense of mystery and left her and her peers confused and speculating what lay ahead. The lack of clarity contributed to an environment of uncertainty, leaving Saoirse’s mathematical identity in flux and heightening her anxiety about what lay ahead. When asked to explain what the class split involved, Saoirse said, “there’ll be two different classes for maths, so, people that’d be more better at it will be together in one class”. Her explanation suggests that she perceives the division as a form of ability grouping. She appears to accept this arrangement but with some unease. Although she does not explicitly express a preference for being in the higher or lower group, she does say she would not want a class that is “too hard” or “too easy”. During the start of her final interview, Saoirse shared that the classes were split at the start of the year and that she is in a new class, “I’m in the ordinary class”. She is content with her new class and does not notice much difference in terms of her learning from the previous year.

**Algebra still an issue**

*“I was struggling with it”*

As Saoirse moved into Second Year, her lingering dread of Algebra continued to surface in her narratives. Despite having encountered only a small amount of Algebra in Second Year so far, she still described it as a significant and challenging experience. For instance, when working with Venn diagrams, she recalled that they incorporated some algebraic equations and admitted she could not remember how to approach them. The I poem that follows (see Figure 5.46) reflect these continued struggles with Algebra.

<p>I’m not looking forward I was struggling</p> <p>I found that very hard My mam was helping me I couldn’t understand I couldn’t remember (She helped) me</p>	<p>We hadn’t</p> <p>We were doing bits</p>
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Figure 5.46: I poem represented Saoirse’s feelings towards Algebra in Second Year [Interview 5]

The poem begins with the collective “we” voice (“We hadn’t”), suggesting that the class as a whole had not fully grasped the topic. However, the shift to the “I” voice in lines such as “I’m not looking forward” and “I was struggling” introduces a deeper, personal response to the

topic. The line “I found that very hard” reasserts Saoirse’s struggle, implying that, while others may have shared the experience, the challenge felt particularly acute for her. This is reinforced by the repeated occurrence of “I couldn’t”. The repetition signals a perceived gap between what she believes she should be able to do and what she is actually capable of. It highlights a belief that she is not succeeding in her mathematics learning and that a level of doubt is now very present in her view of self.

The appearance of relational voices in the poem in the form of: “My mam was helping me” and “She helped me” adds a layer of familial support. These lines echo her earlier experiences in Fifth Class, where Saoirse similarly drew on her mother’s assistance to navigate moments of difficulty in mathematics. The inclusion of these lines here suggests that, despite her continued struggles, Saoirse seeks and values external support when confronting areas of mathematical challenge. Of note, when asked about her outlook for the rest of Second Year and into Third Year, she responds “I think it’ll be all okay once I can get over Algebra”, a strikingly powerful statement that portrays the significance of the topic to her.

### **Primary school in the rear view mirror**

*“You kind of lost interest in it”*

Saoirse looked back with fondness on the safe, familiar environment of her primary school classroom. She described feeling comfortable raising her hand and asking for help, supported by peers she had known for many years. In her words, no one in Sixth Class would “have minded” someone seeking support. However, this contrasted sharply with her experience in post-primary school, where classroom dynamics shifted. In her fourth interview, she reflected on how “everyone says ‘oh this person is putting up their hand and we can’t move on’ and things so,” suggesting there is a pressure, or at least the perception of such pressure, to avoid interrupting and slowing down the class. This observation emerged as Saoirse expressed frustration with not understanding some new topics, when most other peers did.

Despite these differences, in her final interview, when asked whether she preferred learning mathematics in primary or post-primary school, Saoirse chose post-primary. She explained that too much time had been spent on mathematics in primary school, leading to a lack of engagement. The I poem below (see Figure 5.47) explores this experience in more detail.

I think	You spend You kind of You lost interest You mightn't be able to concentrate You have forty minutes You have it four days
I prefer	

*Figure 5.47: I poem describing Saoirse's preference for learning mathematics in post-primary school [Interview 5]*

This poem captures Saoirse's shift in preference through her own reflective and generalised voice. While the poem opens with the "I" voice, the poem is structured mainly around the "you" voice. Statements such as, "You spend", "You kind of" and "You lost interest", appear to generalise her experiences and position them as shared by many students. This shift from "I" to "you" distances Saoirse from her earlier disengagement while also situating that disengagement within a broader pattern of primary school learning. The lines "You have forty minutes" and "You have it four days" reflect her appreciation for the structure and time constraints in post-primary school. In Saoirse's view, shorter, more focused lessons across the week work better. This structure implies a sense of increased efficiency and rhythm, which she appears to value.

Algebra, discussed previously as a significant theme over Saoirse's transition journey, also features during the last interview in her discussions around primary school. Interestingly, she reported that while her class had done "a bit" of Algebra in primary, it was "very easy, it wasn't hard." She noted that the type of Algebra they encountered bore little connection to what she experienced in post-primary, suggesting a perceived lack of continuity or preparedness. In the final interview, she acknowledged that more substantial exposure to Algebra in primary school "would have made it a lot easier... in First Year." This desire for earlier and more meaningful exposure to Algebra underscores the discontinuity Saoirse experienced between primary and post-primary.

#### *5.4.4 Saoirse's contrapuntal voices*

During the third listening, the focus turned to seek out contrapuntal voices present that spoke to the research questions. The three contrapuntal voices identified across Saoirse's narratives were: the voice of validation, the voice of stability and the voice of comparison, each one capturing a key thread across her narratives.

**5.4.4.1 Voice of validation.** This voice surfaces throughout Saoirse’s narrative as a powerful force shaping her mathematical identity. It reflects a deep emotional investment in performance that centres around understanding content and also in securing external confirmation of her competence. While earlier sections highlighted the recurring role of assessment in Saoirse’s experiences, this voice brings a more nuanced insight. For Saoirse, validation through assessment is not merely desirable, it is central to how she defines herself as a mathematics learner. The voice brings to light the volatility of her relationship with mathematics when mediated through test results. Moments of success are fleeting, but also impactful. When Saoirse achieved 80% in a test, she recalled it as her best result since entering post-primary school and directly linked it to feeling “of liking maths then” (Interview 3). These moments temporarily reinforce a positive self-concept, one where she was thriving with her mathematics learning. Yet this confidence proves fragile. In her fourth interview, as she discusses a recent Algebra test, this voice shifts markedly: “I forgot... I lost marks... I only realised now.” What begins as self-assurance collapses into disappointment and self-criticism.

Importantly, this voice is not only about success or failure in an academic sense. It reflects a broader question at the heart of Saoirse’s identity work, where she questions how good she is. Her desire for validation positions mathematics as a domain in which self-worth is always at stake. Additionally, the voice is also anticipatory. Even before test results are returned, Saoirse expresses detachment or pre-emptive disappointment, as though failure is expected unless proven otherwise. Her disengagement from class when things are difficult, “I don’t want to go to maths when it’s hard”, reflects a strong aversion to challenge and an attempt to protect a precarious identity. What this voice reveals is that assessment in Saoirse’s experience does not merely measure learning, it constructs and conditions her sense of herself as a mathematics learner. For Saoirse, as someone who does place such significance on assessment, the move to more frequent formal testing in post-primary school received a mixed welcome. This transition to more testing in post-primary school intensified her emotional response to mathematics that were increasingly governed by outcomes of these tests. When they were good, they had a noted positive impact on Saoirse’s overall feelings towards mathematics. However, when they did not reach up to expectations they seemed to have a disproportionate impact on her overall feelings. The voice of validation offers a window into the high-stakes identity negotiation that underlies much of Saoirse’s experience with assessment.

**5.4.4.2 Voice of stability.** This voice emerges as a grounding thread in Saoirse's narrative. It reveals just how profoundly her mathematical identity is influenced by the consistency and clarity of the classroom environment. While earlier sections of this chapter explored the disruptions Saoirse experienced with changing teachers, pedagogy and learning experiences, the voice of stability uncovers what is at stake when that consistency is absent. When Saoirse's craving for stability is not met, her ability to feel secure and recognised as a mathematics learner wanes.

Saoirse spent much of her time in First Year craving stability. Her narratives repeatedly made reference to the impact of having "loads of different teachers" at the beginning of that year. In the fourth interview, she recalls how each substitute "was kind of telling us different things," creating a disorienting learning environment that left her unsure of which approach to follow. Her frustration with the conflicting explanations snowballed into a deeper erosion of trust in the learning process. This voice draws attention to how her sense of self, as a mathematics learner, is not just cognitive but relational in nature. It is cultivated in environments where the expectations are clear and the teacher remains a steady presence. When that consistency was restored later in First Year, the tone of this voice softens. In her last interview, she spoke warmly of her new teacher: "She explains things a lot easier." The stability of both the person and the pedagogical routine became a source of comfort for Saoirse. It was notable that stability for her originates from learning anchors, including: having organised notes, clear explanations, having a variety of worked examples, that she finds very important. All of these are built around a strong relationship with the pedagogical practices employed by the teacher. They also signal that Saoirse likes to be in control of her mathematics learning and have built-in supports around her.

This voice also surfaced in subtle ways across her narratives. For example, in her third interview, when Saoirse expresses a desire to "keep this teacher" it spoke volumes about what mattered for her in her mathematics learning. In a new school context where so much felt outside her control, a consistent, approachable teacher presented an offer of security. Throughout her narratives, Saoirse conveyed a desire for predictability. When this was threatened, so too was her footing as a mathematics learner. In a way, the voice of stability reflects Saoirse's need for consistency, belonging and relational security in order to feel confident in mathematics. Her narrative shows that her mathematical identity is built, to a large extent, around establishing and maintaining learning relationships that offer her consistency and support.

**5.4.4.3 The voice of comparison.** Threaded through Saoirse's narrative is an attentiveness to the performance of others, her peers. She made frequent observations around how quickly they finish, how well they score, how confidently they engage and how they look on fellow peers. The voice of comparison speaks to her awareness of these peer dynamics and also to the powerful role they played in shaping her own sense of place in the mathematics classroom. This is unlike other students, who have emphasised the central power of understanding and mastery. While Saoirse does value this side of her mathematics learning, it is viewed more so in relation to others. In her first interview, this can be seen through her current description of herself as a mathematics learner: "I sometimes get stuck on some questions that other people will understand." While the previous section described how peer influences affected Saoirse's engagement, this voice exposes something deeper about how her mathematical identity is constantly being negotiated in the social space of the classroom.

The tendency to position herself in relation to others was present right across her journey, from Sixth Class onwards. The voice is especially prominent in her reflections on assessment. In her fourth interview, Saoirse observed: "There could be a few that know a lot, and they'll always be getting very high scores in their maths". While on the outside, this comparison might appear superficial or low-stakes but for Saoirse, it matters more. Her sense of self is being measured against others' success. In the same narrative, she reveals how public, whole-class comparisons limit her ability and willingness to participate, particularly when she doesn't understand something: "You don't want to be holding up the class." When Saoirse felt unsupported by her teachers, her frustration surfaced. This, in ways, could be attributed to the mathematics classroom becoming a space where visibility is risky and mistakes hold reputational or relational risks. For Saoirse, it creates an atmosphere of self-surveillance that clearly had an impact in how freely she engages.

This voice also reflects the silent weight of classroom norms. Being "in the middle" or "not the last one finished" (Interview 1) becomes a kind of protective identity for Saoirse. While for others this positioning may be linked with understanding of learning, for her, it's a way of being safely positioned in relation to others. The positioning offers a sense of comfort, yet it also reveals the fragility of her identity. What matters to Saoirse is where she perceives herself in the hierarchy of her peers. It should also be noted that this voice is not always negative. Saoirse mentions instances where mutual assistance amongst peers provided a supportive setting, enhancing her learning experience: "My friend probably would get a bit stuck on it and she'd

asked me for help and then sometimes if I was stuck I'd ask her friend but like we're both kind of even" (Interview 4). This peer support plays a role in mitigating some of the negative aspects of peer comparison. In such instances, the voice softens and the classroom shifts from a competitive to a collaborative space. While these moments are not as prominent across the narratives, they are important and offer an alternative view of Saoirse's interactions with peers.

Overall, the voice of comparison reveals how Saoirse's mathematical identity is shaped not just internally or in relation to teachers, but through the quiet, continuous process of watching, measuring and responding to her peers. It highlights the performative nature of mathematics learning in school, where, for Saoirse, every hand raised and every test score shared become a reference point for how she sees herself. This comparison can act as a source of reassurance and a site of vulnerability, reinforcing how identity is negotiated within the relational sphere of the classroom.

**5.4.4.4 Interplay of voices.** In examining the interplay between the three voices, there are clear moments of harmony and tension. An example of a harmonious rhythm was when Saoirse experienced consistent, supportive teaching (the voice of stability), she was more likely to feel confident going into assessments (the voice of validation) and less inhibited by classroom comparison (the voice of comparison). In these moments, her identity as a mathematics learner appeared more secure. Her narrative became one of cautious optimism, marked by comments such as, "I liked maths then." The coherence of the voices reinforces a sense of belonging and capability.

However, more often than not, these voices are in tension. The voice of validation often clashed with the voice of comparison. Saoirse's desire to feel competent through test performance was frequently destabilised by public peer comparisons. Even when she understood material, her confidence was undercut by how she imagined others saw her. The classroom became a space of constant surveillance, not just assessment. This tension sharpened the emotional stakes of her learning. Similarly, the voice of stability rarely operated in isolation. Its absence, particularly in early First Year, amplified both the pressure of validation and the threat of comparison. When there were disruptions to teacher consistency, both other voices were amplified. Her enjoyment and security of learning lessened. What becomes clear in this interplay was that Saoirse's mathematical identity was highly responsive to context. Her story was not one of a linear journey, but of movement between voices, each influencing how she journeyed through mathematics learning spaces. These voices add an important dimension to

the earlier sections. It shifts the focus from what Saoirse experienced to how she positioned herself within those experiences and what voices guided that positioning.

#### *5.4.5 Summary*

This section has traced the Saoirse's mathematical identity journey. Through the Listening Guide analysis, Saoirse's narrative revealed a complex and emotionally textured experience. It brought to life the powerful influences of learning continuity, relational dynamics, the role of teacher and peer comparisons.

Key ideas emerged across her interviews, including the importance of teacher consistency and clarity, the emotional and cognitive disruption brought about by Algebra and the increasing visibility and weight of peer comparison and assessment in her post-primary classroom. These ideas were then explored through three contrapuntal voices of validation, stability and comparison, with each one capturing a critical strand of Saoirse's identity negotiation. The interplay of these voices demonstrated that Saoirse's relationship with mathematics is not linear or singular, but can shift in response to shifting classroom conditions. The Listening Guide approach proved particularly powerful in uncovering the tensions and contradictions within her interviews, especially in how she spoke herself into and out of those experiences over time. As a narrative case, Saoirse offers valuable insight into how mathematical identity is lived, felt and negotiated.

### **5.5 Conclusion**

This chapter presented three in-depth narrative case studies, each tracing an individual student's mathematical identity journey across the transition from primary to post-primary school. Using the Listening Guide method, these analyses surfaced the layered and relational nature of students' experiences, with a particular focus on how identity was negotiated in response to shifting classroom and social dynamics. Each case was selected to represent one of three journey patterns identified through initial analysis of the PJGs: stable trajectories, recovery from struggle and standout peaks. Through a series of listenings and identification of contrapuntal voices, the chapter illuminated how students positioned themselves within and relation to mathematics. It showcased how they responded to challenge and how relationships, practices and comparison played a role in shaping their sense of self as mathematics learners.

The three contrapuntal voices identified in each narrative provided a powerful lens for understanding the complexity of identity work. Together with the I poems, they highlighted both alignment and dissonance between personal experience and the broader structures of

schooling. These narrative cases lay the foundation for the thematic analysis that follows in the next chapter, which explores common threads and broader patterns across the full cohort of participants.

## Chapter 6: Findings of the thematic analysis

Linked to the PJGs (see section 5.1) are accompanying narratives in which students reflected on, explained and justified the scores they provided. These reflections offer valuable insights into their mathematical identity journeys across the transition. Through a thematic analysis of these narratives, it was possible to explore the evolving, and often complex, nature of students' relationships with mathematics during this time. The thematic analysis approach used is described in Section 4.5.2 and involved a thorough examination of interview data.

Three themes, which focus on exploring the factors that influence students' mathematical identity across the transition, are presented below. These themes centre on (i) the teacher and classroom learning environment, (ii) experiences of difficulty and challenge, and (iii) the role of assessment and peer comparison. Importantly, the narratives in question relate to a specific part of each of the 85 interviews, the point at which students were invited to reflect on and provide a rationale for their score on their PJGs. This score represented their experience and relationship with mathematics. Accordingly, the themes presented below are based on a targeted section of the interviews, rather than encompassing the full conversations.

### 6.1 Theme 1: The impact of the teacher and the classroom learning environment

The influence of the teacher emerged as a central factor in shaping students' mathematical identities during the transition. Students placed strong emphasis on their teacher's approach to mathematics teaching, particularly how mistakes were treated, how clearly concepts were explained and the kind of learning experiences fostered in the classroom. These aspects, along with broader shifts in classroom dynamics and increasing expectations for independent learning, played a key role in how students experienced and adapted to the transition.

#### 6.1.1 *Sixth Class: Importance of clarity*

Over the first two waves of interviews in Sixth Class, students made occasional references to the important role teachers played. For many, the move to Sixth Class - often involving a new teacher - was viewed as a positive change. Several students described how their teacher helped support their understanding in mathematics. Comparing her sixth-class experience to that in Fifth Class, Maeve noted her new teacher "made a difference", explaining that she "understood things clearer than in Fifth Class." In the same narrative, she elaborated

further, stating “The way they explained things well and they would, like, show us how to do something if we didn't understand it.”

Clarity of explanation emerged as a key feature of students’ reflections. Almost all students identified this as crucial to helping them build understanding in mathematics. Clodagh, for example, concluded, “The teacher was easy to understand throughout it all”. Similarly, Seán, when asked about what supported his positive experience in mathematics, responded, “Well, like a good teacher, who is nice and that can explain stuff well. That is important.” In contrast, Gráinne linked a drop in her PJG score to a lack of clear instruction on the topic of Percentages, recalling, “it was just that it wasn't as good because it was just the way people were explaining and stuff”.

The teacher’s influence also extended to shaping the broader classroom experience, which also impacted how students viewed mathematics. Áine appreciated the chance to collaborate, explaining, “We get to work with our friends sometimes to help each other,” while Cara connected her enjoyment to hands-on activities like using scales and metre sticks. In her second interview, Gráinne noted that once the standardised tests were completed, learning became more enjoyable, “After the test, it was just kind of like fun maths,” which she associated with problem-solving and working with peers. Niamh also highlighted problem-solving as a positive, citing the balance of challenge: “It wouldn't be hard and it's not easy, so I'd say in the middle.” Other students referenced the use of technology, real-life applications and new topics as contributing to a more engaging and motivating classroom environment, as long as the level of challenge remained appropriate. In contrast, when these kinds of interactive experiences were absent, students expressed dissatisfaction. Cara shared that learning “got a bit boring near the end,” explaining, “we didn’t do much hands-on, it was more kind of writing it and more brain work.” Finn echoed this, contrasting his current experience with earlier years: “In Fourth Class you’d be playing a game or something that helps you learn it. Now it’s just sit down, write in your copies, that’s it.” For students like Finn and Cara, the shift toward more independent, less interactive learning was linked to a decline in enjoyment and a sense that mathematics had become “not really much fun”, a change that appeared to shape their evolving relationship with the subject.

### ***6.1.2 Start of First Year: New experiences and early adjustments***

The beginning of First Year brought a wave of change as students adapted to new teachers, classroom environments and learning experiences. The third wave of interviews saw a substantial increase in references to teachers. For many, their new teacher was a positive

influence, reflected in increases on their PJGs. For Niamh and Cormac, the teacher was the main reason behind their improved scores, with Cormac putting it plainly: “Well, it’s been good because I have a good teacher.” As in Sixth Class, the clarity of explanations remained crucial. When seen as effective, this clarity supported a positive transition experience. Some students also valued the structured approach offered by their teachers, such as revision strategies and visual organisation. Niamh explained, “Probably because at, like, the end of each chapter, she does like a revision page and does things in different colours. We keep it, then, in our folder.”

Others highlighted the engaging, collaborative nature of the learning experienced. Áine described how her teacher allowed the use of whiteboards and group work, which she credited as a positive influence: “So every day like at the end of class, she’ll give us sums from the topic we’ve been learning and we have to write the answer on our whiteboards and I think that’s like a really good way of learning.” Students, including Cian, appreciated “experiencing new things”, while Finn commented that “it’s more fun”. The novelty of First Year mathematics, along with creative teaching strategies, contributed to positive early impressions for many students.

On the other hand, some found the adjustment to new teachers and methods more challenging. Caoimhe struggled with her teacher’s insistence on using specific methods, which differed from those she had previously learned, which led to a drop in her PJG score. Gráinne also missed the individualised support she associated with primary school, “In primary school, like, you got ... one kind of, like, teaching and now you just kind of have to, like, take down the notes and, like, figure it out kind of by yourself, you know?”. Meanwhile Maeve pointed to less effective explanations as a reason for her decline. A small number of students felt that learning in First Year was overly teacher-directed. Maeve found the lessons “hard to just listen to... for the whole entire like, lesson” and noted a desire for more interactive learning. While most students embraced the novelty of First Year, Maeve found it challenging and something she had to get used to. Oisín, meanwhile, noted that mathematics learning had not been “fun”, though he had not expected it to be in post-primary school.

Students also described changes in how they approached learning. Note-taking became a common feature, marking a departure from primary school practices. In describing a typical mathematics class, Cormac stated, “We usually take notes at the very start of class, and then we work to learn them”. Similarly, Niamh described it as, “mostly take notes from the board and then do examples of it in our copies,” adding, “It’s a bit different to primary school because we didn’t take notes”. Interestingly, Seán viewed note-taking as a positive change, explaining:

It's just easier for me I think, because in, like, Sixth Class in our primary school, they, the teacher would just like tell the whole class, and sometimes that's a bit hard because all the noise and stuff, and yeah I think it's just better to have it written down so you can go back over it.

Others were less positive about note-taking. Caoimhe noted that copying notes did not help her understand definitions or procedures, while Cara equated it with “learning things off by heart”.

For many, the shift to mathematics-specific lessons, along with the new timetable structure, stood out as a significant change. Cormac noted how mathematics now felt more focused, “We do it more too, like you've classes for that subject now so you're more like concentrated on it,” while Enya appreciated having dedicated time for it. The frequency of mathematics class also mattered, with Cian enjoying having breaks between classes, saying, “I think it's just nice and relaxing to get a break”. Aoife found having mathematics three times a week preferable, attributing her higher PJG score to this change, “I only have it three times a week, so it's not like every single day, which is, I find better”.

### *6.1.3 End of First Year: Adjusting to new realities*

In interviews conducted at the end of First Year, the influence of teachers on students' mathematical experiences became even more pronounced. As before, this impact differed among students. Interestingly, the way a teacher approached mistakes emerged as an important factor. Cian observed:

She doesn't like get overly stressful about anything, you know? Whenever you make a mistake, she's like, there and then, and once you get to know it and understand why you made the mistake, or you understand now how to do it, that's more important.

This emphasis on learning from mistakes resonated with Cian, whose PJG score peaked during this period. Aine and Aoife also experienced similar peaks, attributing them to their teachers' support and clarity. For some students, the emphasis the teacher placed on understanding was also deemed noteworthy, as Aoife explained, “the teacher is like making sure that you do understand it.” Similarly for Clodagh, who initially found Algebra daunting, noted that her teacher's explanations helped ease her anxiety: “I was, like, a little bit scared going into it... but the teacher was just good at explaining it and I understood it quickly.”

Beyond the role of the teacher, students commented on their evolving learning experiences. Peer support emerged as helpful for any student that mentioned it, with Áine highlighting the value of getting “help” from classmates. Aoife described the positive learning experiences provided by her teacher which made learning enjoyable, “She did little rhymes with us and she just, she explained everything, like a lot of times before we actually had to do it by

ourselves... I think she made maths more fun". Cian also appreciated more active learning, "Like going up to the board and writing it down, rather than just like correcting it from your copy... you're very like, always involved in, like, the teaching". He expressed a preference for it to occur more frequently, "So we're not constantly like, in our copies, doing sums like all the time". In a similar vein, when discussing the use of copies and books, Saoirse viewed them as something that dominated her learning experiences. She spoke about how she "just kind of opened the book and did the questions." Cormac also described his lessons as repetitive, stating that the teacher provided examples and then assigned work, "He just tells us, gives us an example of something and then for the rest of the class, he just gives us work to do and we just end up doing that. It makes it a bit boring". Finally and of note, there are frequent references to "sums" and "questions" when participants spoke about their daily learning experience. In most cases, such references were not viewed in a negative sense, but instead just something that they accepted were part of their learning experiences.

Several students explicitly highlighted the negative impact of their teachers on their relationship with mathematics. Ciarán, who switched teachers mid-year, reflected positively on his previous teacher but noted that his new teacher created a different classroom atmosphere, "The new teacher does it a bit more different." This coincides with a drop on Ciarán's PJG, something he attributed to this change in teacher. Similarly, both Seán and Patrick, referred to their teacher as contributing to a drop on their PJGs. As Patrick explained, "Just how she kind of introduced it or explained the maths to me." For Seán, misbehaviour in the class was not being addressed effectively by the teacher which resulted in him being distracted from his learning. Meanwhile, when discussing her mathematics teacher, Gráinne describes how the atmosphere they created in the class resulted in her not feeling as positive about mathematics as she did in Sixth Class.

Across the fourth wave of interviews, the initial novelty of First Year had faded for a good cohort of students. For some, who previously spoke positively about their initial experiences, a note of reality was now evident in their narratives. Cian appeared somewhat fatigued after this first full year, as he explained, "Yeah, I'm just used to it now", before elaborating, "I'm not as excited. It's just like, it's kind of like I'm tired, I guess, like you're just kind of like fed up a little bit." Similarly, Cormac highlighted how the repetitive nature of his mathematics learning has caused a drop on his PJG. As he reflected on why he felt differently at the beginning of First Year, he concluded, "I think I just started to enjoy it a bit more at the start of First Year because I met new things". Now he expressed a desire for a change of teacher for next year to avoid the repetitive nature of his current learning experiences, "I hope it won't be

the same anyway.” Of note also, Gráinne, who generally spoke very positively on her experiences of mathematics learning, explained she has recently found it “a bit boring”.

For other students, the time between the third and fourth interview allowed them to adjust and become more accustomed to their mathematics teacher, their expectations and pedagogical approaches. Caoimhe spoke about her increase on her PJG as linking to how she is “more used to secondary school now”. She reflected that this process took time for her, especially getting used to “a different, like, way of learning maths” that she claimed were very different to what she was used to in primary school. This sentiment is echoed by Maeve, who spoke about enjoying mathematics learning more now, “I’m like enjoying maths a bit more than at the start of the year. Like, I’ve finally figured out how to like, like, learn with like my teachers and things.” Other students, including Áine and Saoirse, reported feeling more confident with their mathematics learning, as Áine shared, “But now I think I’m like, more confident and that I’m actually good at it like,” and Saoirse, indicated that after an initial period of uncertainty, she became more comfortable with the new expectations, as she noted how “every month that goes by, I feel a bit better about it.”

Finally, within this theme, homework emerged as a factor, with teachers’ structures and expectations around homework seen as having an influence on students’ views of mathematics learning. As students moved through First Year, many experienced an increase in both the volume and difficulty of homework. Cara, noted how homework “is a lot longer and probably more difficult,” capturing a common sentiment shared by many that highlighted the increasing demands it is placing on students. On the other hand, some students adapted positively to these changes. For Seán, homework was deemed manageable, as he explained, “Our homework is fine. It’s just, like, we either just go back over all we did or ... answering a few questions”.

#### ***6.1.4 Start of Second Year: The teacher still matters***

As students moved into Second Year, many encountered new teachers once again. In their narratives, they emphasised the continued influence of teachers on their engagement and relationship with mathematics. As in earlier interviews, they stressed the importance of clear explanations and supportive teaching practices. For several students, effective clarity and approachability of their new teachers had a positive effect. Cian appreciated how his teacher explained concepts in a straightforward way: “Yeah they’re good, good at explaining stuff. Maybe a bit better than our last teacher.” He went on to note that the explanations were presented in a way that made them easier to remember, “without using like, a lot of say like bigger words, or they just explain it in like just an easier way, and it’d help us to like remember”.

Saoirse also described the improvement with her new teacher, who she felt made learning easier compared to her previous teacher. The consistency and clear communication from her Second Year teacher created a more stable learning environment for her. She explained, “She gives us lots of examples too so we can look over them more for tests and go back and do more questions. She's just nicer to us and explains it much better.” Patrick also reported a striking improvement on his, linking it to a new teacher, “Yeah, like I love maths now because of the teacher and I didn't last year.” Similarly, Enya stated simply, “Teachers like matter more,” in these years. However, not all students found the transition to a new teacher smooth. Some students found it challenging to adjust to the styles and expectations of new teachers. Cara described the difficulty of adapting to different teaching approaches, “You have different classes and different teachers and you're trying to learn off different people's ways,” with these seen to directly impact her perceived relationship with mathematics. Seán shared a more general dissatisfaction with his Second Year experience, “Yeah, and the teacher isn't maybe too good and just kind of everything like that”.

Students also commented on changes to the learning experiences their teachers offered. Aine highlighted the absence of peer interaction in her new classroom, “The tables in my class are kind of in a line, so we don't really get to talk to people and work together.” This arrangement clashed with her preference for collaborative learning that she spoke to previously. Others noticed a slight dip in their enjoyment of mathematics, linking it to the learning experiences, with Gráinne reflecting, “I don't probably like it as much”. An increased emphasis on note-taking also shaped students' experiences. Saoirse described a shift in approach, “Last year, we took no notes and just kind of opened the book and did the questions. We have more things to study now, which makes it easier.” For her, this offered structure and helped with preparation.

### *6.1.5 Summary*

The first theme emphasises the crucial role of the teacher in shaping students' mathematical identities during the transition. While students' individual experiences varied, a consistent thread across the data was the central importance they placed on their mathematics teacher. Clear explanations, emotional support and a sense of stability in the classroom were highly valued, as were learning experiences that offered collaboration, novelty and appropriate levels of challenge.

At the same time, the findings reveal how sensitive students were to shifts in teaching style and classroom routines. Positive teacher–student relationships supported confidence and

engagement, while changes in personnel, lack of clarity or rigid methods often contributed to confusion or disengagement. The relational nature of mathematics learning was clearly evident, with students' identities shaped not just by what they were learning, but by how they were being taught and supported to make sense of it. The theme highlights the nuanced ways in which pedagogical choices and teacher expectations shaped both the emotional and cognitive dimensions of students' mathematical identity.

## 6.2 Theme 2: Negotiating difficulty and challenge across the transition

The transition from primary to post-primary school brought significant shifts in how students experienced and interpreted mathematical difficulty and challenge. As they encountered new content, pacing and expectations, they navigated these shifts in diverse ways, at times feeling stretched and at other points, affirmed in their abilities. Their narratives reflect the relational and evolving nature of mathematical identity, shaped by how hard or easy mathematics learning was perceived and also by how they understood their own capacity to meet challenges along the way.

### 6.2.1 *First half of Sixth Class: Some difficulties at the beginning*

Across their first two interviews, most students spoke about how difficult they initially perceived mathematics to be. The move from Fifth Class to Sixth Class represented a transition in its own right, resulting in a period of adjustment. For some, encountering new topics in mathematics was perceived as initially challenging and this influenced how they related to the subject. Students spoke about specific areas of difficulty as points of struggle, namely, Decimals, Time, Profit and Loss, and Long Division. Ciarán typified this sentiment when he described: "I suppose the decimals and distances and like multiplying your distances, like you might have to find out how fast you were going over a period of time. I found it was, at first it was, hard." New or unfamiliar content was often equated with difficulty, as Áine explained: "We were like doing stuff that we haven't done before in maths and it just kind of got harder." Algebra was only mentioned by one student at this point, Oisín, who linked it to his relatively low PJG score: "Probably like seven because it wasn't like amazing because it was kind of, it was like a lot trickier because we hadn't done stuff like Algebra before."

Alongside these reflections on difficulty, a significant number of students spoke about the perceived ease of learning during this time and the positive effect it had on their relationship with mathematics. For many, the content in early Sixth Class felt familiar, with learning often described as a revision of material from Fifth Class. Aoife shared her view of mathematics learning at the start of Sixth Class:

It's like going over what we did in the Fifth Class. So when I got when I, like, figured things out in Fifth Class, now going over them and just, like, double checking on everything, I already know, like, what we're doing so I'd say it's easier.

Similarly, Niamh also noted the crossover with previous learning from Fifth Class, “it was easy enough and there wasn't as many new topics. I thought it was a bit the same as Fifth Class.” Enya welcomed this sense of ease, commenting that it made class time go by faster. For all students who described the learning as easy or familiar, this was universally framed as helpful. It boosted their confidence and was often cited as the primary reason for a higher score on their PJG.

### *6.2.2 Second half of Sixth Class: A sense of mastery*

As students approached the end of Sixth Class, many spoke with greater confidence about their mathematics learning. Compared to the first wave of interviews, there were fewer references to difficulty. For the vast majority, as Sixth Class continued, they perceived mathematics learning to get easier, with narratives speaking about improvements in their understanding of mathematics concepts and a certain sense of mastery of primary mathematics in more general terms. In discussing her two point increase on her PJG, Clodagh attributed it to her improved understanding, “I just understand a lot of things better, and I feel good about maths”. Similarly Oisín, who like Clodagh, gave his highest score on their PJGs for this period, spoke about understanding and the ease of learning, “Probably an eight [i.e. a score of 8/10 on his PJG] because, like, I felt I understood topics really well and even when we did the revision using the work sheets, I found I got most of them right and they were easy”. Aoife summed up her final months in Sixth Class with a degree of completion, “By the end, I think I learned everything that I really could learn for maths.” This sense of mastery often translated into increased confidence. Maeve shared: “I just kind of understood like every part of the maths and it was like, easy then. Like, compared to all the other times. I knew no matter what we were doing, I would understand it and be able to answer it.”

Others, who had previously struggled, spoke about overcoming these challenges through revision. Áine, who had found Long Division difficult earlier in the year, explained: “We went over long division again, and I feel like I've gotten better at that ... I feel like I understand a lot of things more.” Indeed, Áine's experience boosted her score on her PJG as she concluded, “I feel like I've gotten better at maths”. The positive impact of revision was echoed by many students. In describing his experience, Cian emphasised, “it was quite easy in the last few months, it was all revision really”. At this point, a couple of students also spoke to being satisfied at the level of challenge in mathematics learning. Ciarán talked about enjoying the level of

challenge on offer, “Nothing was hard, but nothing was easy either, it was like a bit of a challenge but having, like, having the challenge kind of made it a bit more enjoyable.” Additionally, Niamh responded favourably to the level of challenge, “It wouldn't be hard and it's not easy so I'd say in the middle.”

That said, not all students had uniformly positive experiences. A small number mentioned that certain new topics remained challenging. Caoimhe spoke about speed and time problems as difficult, noting they led to a drop in her PJG. Enya similarly referenced learning new topics that proved difficult initially, “We're getting like new stuff that we hadn't learned in Fifth Class, and they were a bit harder.”

### *6.2.3 Start of First Year: New content, mixed reactions*

The transition to First Year brought a noticeable shift in students' perceptions of difficulty. New topics and a faster pace challenged many, and impacted their relationship with mathematics. Over half of the students mentioned difficulty as negatively affecting their PJG scores. Cara reflected, “Probably like five because I feel like in between, but, like, I wouldn't hate in a way but it's definitely not one of my favourite subjects because it's quite hard.” She linked this to larger numbers and the presence of unfamiliar symbols: “The numbers get bigger as you move on... and you have to make sure you know them, like, to answer questions.” Gráinne also described a significant change, saying, “It's gone all lettery and I don't really like that,” and later added that she missed the types of learning in primary school: “I liked the plusing and multiplication and long division and long multiplication a bit more than... brackets and stuff.” Meanwhile, Oisín found formulas difficult to manage, commenting, “I always mix up the formulas for the midpoint and the slopes.” Others named specific topics, with Maeve mentioning “Sets” as something she found initially difficult and confusing: “I didn't really like it because it was really new to me and I wasn't really getting it at the start.”

Alongside the challenges they encountered, many students also described experiences of ease and familiarity with mathematics learning, particularly where it connected with prior knowledge. Cian, for instance, gave a high PJG score, explaining that mathematics had not been “too difficult.” Aoife similarly noted, “Our maths isn't like extremely hard... it's most of the stuff that we've done in primary school.” In justifying her positive uplift on her graph, Enya compared it favourably to the previous year: “I didn't really like maths last year and it was probably harder last year too”, adding that the continuity helped her feel more confident: “I realised how much I knew about it from last year”. Niamh and Saoirse also used the word “easy” to describe their experiences, which contributed to improved understanding and more positive attitudes.

However, for some students, this ease led to disengagement. Patrick explained, “I find it kind of easy so that’s probably making it boring”, while Oisín commented, “It’s not that hard. So it’s like, I don’t mind it, it’s just kind of boring”. These sentiments were particularly evident in how students responded to the revision of topics covered in primary school. Ciarán, for example, described this as tedious: “I did lines and angles in the first few weeks and we’d done that in Fifth and Sixth Class... working with degrees and getting what angle it is and all that.” He noted that such repetition tends to make learning “boring” for him. Patrick echoed this frustration: “It’s probably because we haven’t been doing like more things... the same thing for like the last month or two months now and it’s getting very boring”, adding that Sets was the only topic he had encountered since entering post-primary school. In contrast, others appreciated the opportunity to revisit familiar material. Aoife explained, “We go over the stuff that we’ve done, and so it’s not too difficult.” Finn welcomed the balance between revision and new learning: “They’re mixing in the old topics with the new topics... so we go from not knowing anything about this topic, really, to knowing a good bit about that topic.”

#### *6.2.4 End of First Year: Rising difficulty and emotional impact*

By the end of First Year, students increasingly referred to the perceived difficulty of mathematics. When discussing their PJGs, many narratives centred on the increased difficulty and its effect on their overall relationship with mathematics. Unlike earlier interviews, where learning was often described as manageable or even easy, these accounts overwhelmingly focused on challenge and struggle. Specific topics, most notably Algebra, were frequently cited. Maeve found Algebra confusing, particularly because of the unfamiliar symbols: “It just kind of confuses me with all the letters and different symbols.” She felt disadvantaged not having encountered it in primary school: “Yeah, I would have. It might have been handy for now.” Others echoed the sense of unfamiliarity. Clodagh reflected, “It was nearly all new. We didn’t really do anything like that in primary school,” and Saoirse noted the contrast with earlier content: “The few chapters at the start of the year ... would have been a lot easier. Now we’re going on to harder ones like Algebra, so that’s why it’s probably down a bit.” Some expressed frustration with the prolonged focus on a single topic. Finn remarked, “Just somehow, we spent two or three full months on Algebra and it gets kind of boring after a while just looking at the same thing.” Similarly, Caoimhe shared, “Like for Algebra, I think we’re spending most of our time doing it now”. In addition to Algebra, students described general difficulties with newer topics. Enya observed, “When we start a new topic or chapter, you kind of feel a bit confused at first.” Aoife commented on the cumulative load of her mathematics learning, “Now that we’ve

learned a lot more, it's harder to remember everything... and newer things are a bit more difficult."

For some students, the rising difficulty level led to a decrease in enjoyment. Cara noted, "I wouldn't be any higher because it's not the most enjoyable thing when you're stuck on questions, and you don't understand it." Patrick, reflecting on his PJG score, stated plainly, "Well, it is low overall because maths is hard now. It isn't easy to understand it all." He added, "Maybe maths was just easier in primary school. I understood it more there." Oisín shared a similar view: "I probably used to like it more because it was easier maybe." Many students echoed this sentiment that mathematics had become more demanding and less enjoyable over time. Cara observed, "It's definitely after getting a lot more challenging in the last few months," while Cian reflected, "At the start of First Year I was quite high, and how I found maths alright then, and it wasn't like too, too difficult."

There were few instances of positivity in this area. Caoimhe described being in a better place with mathematics because current topics required less intensive working out: "Now we're kind of doing, not like easier stuff, but like, it needs like less like, working out... there's like less steps and stuff with it." Additionally, Aoife found revision helpful in re-establishing understanding: "We've learned a lot of new things and some of it's been hard, but now that we're going over it again, like it comes back to you, and you remember it all." There were few instances of a productive disposition toward mathematics across this wave of narratives. Clodagh, while finding mathematics learning challenging, focused on working through these short-term difficulties: "Some things are a little bit more difficult than others, but I am getting through it." She described how difficulty diminished over time: "You don't know what it is at the start but then when it goes on, it gets a bit better... I'm used to it now."

### *6.2.5 Start of Second Year: Navigating new challenges*

The move to Second Year brought a more widespread and sustained perception of increased difficulty in mathematics. Once again, this shift was seen to impact the understanding and overall enjoyment of the subject for many students. As Cian aptly put it: "I think maths has gotten harder now than what it was ... it's definitely gotten like a lot more difficult as you go on," capturing the broader sentiment among students. Although not uniform, students reported challenges that varied by pace and the complexity of new concepts. For several, the jump in perceived difficulty from First Year was clearly felt. Niamh, explaining a drop in her PJG score, commented: "I think it's an eight because it's after getting more difficult than it was last year." Aoife, having moved into a higher-level class, captured a sentiment shared by others: "It's

definitely gotten a bit harder since First Year". Áine similarly stated, "I think mainly maths", when asked which subjects had become harder. Finn took a unique pragmatic view, and linked this change to the natural progression of schooling, stating: "Because we are in Second Year, you have to learn the new stuff".

Students frequently cited multi-step problems and word-heavy questions as particularly difficult. Ciarán explained: "It's a lot more problem-solving ... and then maybe having to do a different problem to find the answer to the problem you're looking for." Áine also noted the confusion caused by layered problems: "You have to put two different types of sums together and I find that a bit confusing because I don't know when to use which type." For many, this level of complexity had an emotional impact. Ciarán described how certain questions could be overwhelming: "The questions in maths kind of like stun me for a second." He added, "I'd maybe like doubt myself a little bit during them". As with before, students continued to find topics like Algebra, Volume, and Sets particularly demanding. Cara identified Algebra as especially challenging, noting, "It's more intense this year." Saoirse echoed this feeling towards Algebra, adding, "I'm not really looking forward to it because I was struggling with it." Although Caoimhe suggested a growing familiarity with Algebra, "Like Algebra is just methods... I just did an adding or calculation wrong", for most students, the topic remained conceptually challenging and emotionally draining.

Another key factor was the pace of teaching. Several students felt that topics were being introduced too quickly. Áine reflected: "You've to kind of speed through them in class more... I'm still only trying to figure them out and then we have to move on to another thing." Clodagh noted that she needed more time to consolidate understanding: "It would take a little bit for me to understand instead of getting it straight away." Finn contrasted his two teachers' approaches, preferring a slower pace: "I prefer the normal pace as it gives me more time to learn it properly. I feel I can pick it up easier if we go at a normal speed."

Notwithstanding the challenges presented above, some students demonstrated resilience and growing adjustment. Patrick shared: "I think it's getting a bit easier and my understanding is going well. I just feel happier with maths this year". Clodagh described the learning curve she underwent, with a sense of resilience evident, "Some topics didn't come straight away to me... It just takes a bit longer." For one student, Cormac, the challenge itself was viewed almost as a badge of honour. Being placed in a higher-level class seemed to support his identity as a capable maths learner: "This time it's higher maths... I'm one of the best in my class, so it's not too bad".

### **6.2.6 Summary**

Students' perceptions of difficulty and challenge shifted notably across the transition from primary to post-primary school, with clear implications for how they saw themselves as mathematics learners. In early Sixth Class, some described new topics as difficult, but the familiarity of much of the content, often framed as revision, helped maintain confidence and reinforce a sense of competence. By the end of Sixth Class, most felt they had achieved a level of mastery, with revision and repetition playing a central role in consolidating understanding.

This confidence was unsettled for many students upon entering First Year. New content and a faster pace of learning contributed to a growing sense of difficulty, which in turn challenged students' self-concept in mathematics. For some, these demands were motivating, but for others, they led to frustration or disengagement. By the end of First Year and into Second Year, challenge was a more dominant theme across narratives. Algebra, problem-solving and the increased complexity of learning were often raised as barriers. While a small number of students spoke about developing resilience and a willingness to work through difficulties, the majority of students expressed dissatisfaction with the level of these new challenges. This theme emphasises how perceptions of difficulty are deeply tied to students' confidence and sense of identity. In some cases, their narratives suggest that these challenges are compounded by an absence of support.

## **6.3 Theme 3: Navigating assessment and comparison**

As students moved from primary to post-primary school, assessment and comparison were seen to have become increasingly central to students' overall experience of mathematics. This theme explores how formal tests, classroom assessments and peer comparisons shaped students' journeys. For some, strong results and praise helped to affirm a positive identity, while others found the increased pressure and pace of testing to be unsettling. Alongside this, students often measured their progress against their peers, through test scores, classroom interactions and perceived ability. The narratives revealed how academic and social dimensions of comparison became increasingly intertwined, subtly shaping students' relationships with mathematics.

### **6.3.1 Sixth Class: Standardised testing the norm**

In Sixth Class, references to assessment were relatively infrequent across the narratives. When they did appear, they often reflected positive or neutral sentiments. Most insights centred on standardised tests, typically conducted toward the end of the school year. Perhaps surprisingly, these tests did not seem to provoke notable anxiety or negatively affect students'

mathematical identity; instead, they were often framed as opportunities to demonstrate learning or receive validation. In his second interview, Cian reflected on his experience with his recent standardised test, saying, "I found doing the test grand, so it was just all the stuff that I really know, so that was alright and I was quite happy with the result I got." This positive view was echoed by several other students. Maeve, for example, openly discussed her result and stated that, "We got our tests back, and I got a ten in maths, so I was very happy with that and my mam was happy too." Finn similarly compared his score to his classmates, saying, "I got some of the highest in the class, I think." At this stage, references to comparison with peers, although few, were beginning to emerge. Students like Finn noted their performance in relation to others, which may have signalled the early presence of comparison-based identity markers. While students clearly noticed and remembered their scores of these tests, indicating that they attached a level of importance to them, they did not report significant feelings of pressure around testing. The following insight from Finn summed up sentiments also felt by other participants also, "It doesn't make me feel any different, I just, I just try and get a good score, hopefully."

Beyond standardised tests, two students mentioned class tests in mathematics. Gráinne highlighted her results from the first half of Sixth Class, "At Christmas, I was happy because in my Halloween test, I didn't get the score I wanted, but in my Christmas test, I did, so I was really happy about it." Similarly, Caoimhe attributed her PJG rating to these assessments, noting, "I think maybe an eight or like a nine, probably an eight because I got higher scores at Halloween and Christmas than in February and summer." For both students, test results appeared to play a significant role in shaping their mathematical identity.

### ***6.3.2 Start of First Year: A new emphasis on testing***

The move to First Year marked a distinct shift in how students experienced and responded to assessment. Many described a noticeable increase in the frequency and perceived importance of tests compared to their experiences in primary school. This change was often framed as a key difference in their transition to post-primary mathematics learning. Cara articulated how the testing culture shaped her overall view of mathematics in early First Year, stating, "The learning things off by heart, um, and the exams probably, yeah," was the biggest change from Sixth Class. The narratives conveyed that such a change was not perhaps expected and appeared to catch some students by surprise, as Ciarán shared, "The tests come up so fast". Several students commented on the unexpected pace and volume of assessments. Finn observed, "In primary, we didn't have as many tests, but now we're always, like, getting ready

for the next one". This sense of a faster paced, more assessment-driven learning experience led some students to feel added pressure. Cormac reflected on the broader changes, "They say to study more and there's kind of more of a rush because we have to do tests in other subjects too. Whereas in primary school, there's not really tests, so it doesn't really matter as much". Indeed, many students began to adopt more structured approaches to revision. Niamh explained, "I've started studying way more at home because I know the tests are going to be harder. You have to be ready". Cormac described his preparation method: "Well, for the exam I had the notes already down, like the set things, I had them already done. So I just memorised them and then I just did sums for all the topics to practice."

For some students, early assessment experiences were particularly challenging. Seán described his reaction to a recent winter exam: "Yeah, we had our winter exams last week, in maths. It was really hard. It was too advanced for us. I thought it would be easier". The surprise and difficulty of the test stood in contrast to his earlier experiences, and he noted, "Some people studied more than others. I didn't study that much." Maeve similarly shared her discomfort with a computer-based test she completed: "I kind of prefer, like, written tests, because, like, if you press the wrong button, it would, like, go without, like, you being able to submit your full answer."

### *6.3.3 End of First Year: A growing awareness of comparison*

By the end of First Year, the role of assessment had become more pronounced in students' narratives. Students frequently spoke about class tests, end-of-term exams and how these assessments had become part and parcel of their mathematics learning. While some felt affirmed by their test results, others expressed a sense of disappointment, frustration or even disengagement when outcomes did not match their expectations. For many, assessment acted as validation, with students beginning to recognise tests as helpful indicators of their understanding. Aoife shared, "We've had more tests on, like, the end of chapters, so the teacher is like making sure that you do understand it," and Niamh noted, "I'm picking them up okay. Like I do well in the tests after the topics." For Clodagh, revision strategies helped reduce her anxiety: "I'm not scared going into the Summer test because our teacher has been doing, like, revising in class." She added, "She's given us all the chapters that we need to study so we know exactly what to focus on." Others, however, described how assessment negatively impacted their confidence. Gráinne noted, "I don't do as well in tests and stuff like that".

This period also marked a notable rise in peer comparison. Students increasingly became aware of how they were performing relative to their classmates, particularly through the sharing

of test scores and through subtle cues in class. For many, these comparisons were tied closely to their developing mathematical identities. Saoirse highlighted this dynamic, noting, “They’d be saying, ‘Oh, I got ninety something in my test’, and you might have gotten maybe in the seventies and the sixties.” She also appeared conscious of her own image amongst peers, claiming, “you don’t want to be coming across like you don’t know everything in class, because there could be a few that know a lot, and they’ll always be getting very high scores in their maths, and then there’ll be people that are, just, they struggle with maths.” These comparisons seemed to shape how students positioned themselves as learners, often creating informal hierarchies in the classroom. Cara pointed out that, “there are people that find it really tough and then there’s people that find it, like, a little bit easier.” Maeve described how she struggled to adapt to classmates who used unfamiliar strategies, noting: “In primary school, it was like we all knew the same way... now it’s kind of like people learn it in different ways.” These differences sometimes contributed to a sense of insecurity or isolation. At the same time, Ciarán reflected more positively on the collaborative aspect of peer learning, “Kind of everybody either struggled with it together or one person got it and everyone helped.” For some, this dynamic extended to their broader sense of belonging. Seán, for instance, reflected on how classroom distractions and behaviour affected his learning, while Finn described being negatively impacted by being seated beside disruptive peers, saying, “That made me not like it as much.” For these students, academic confidence was entangled with the social context of learning.

Another influence of peer comparison in First Year involved situations in which students encountered difficulty and sought support with their mathematics learning. In describing the difficulty she had learning Decimals in First Year, Enya explained what it was like to seek support from her mathematics teacher, “It was kind of like am, it was kind of embarrassing, because I kept having to ask questions and stuff.” Saoirse shared a similar sentiment, not wanting to “hold up the class” or appear as though she didn’t know the material, especially when compared to others who excelled. In the same narrative, she went on to compare the experience of asking for the support of her mathematics teacher in post-primary school with that of her previous teacher in primary, “A lot of people in Sixth Class, like you would have been with them for a couple of years and like they wouldn’t have minded and now this year, everyone says ‘Oh this person is putting up their hand and we can’t move on’ and things so.”

#### ***6.3.4 Start of Second Year: Streaming and higher stakes ahead***

In the final wave of interviews, assessment continued to play an important role in students’ views of mathematical learning and their place within the mathematics classroom.

Positive results reinforced confidence for students like Cian and Cormac, who felt their strong performance in tests justified their placement in higher-level mathematics classes. Cian noted, “My test results in maths are higher than most of my other subjects, so I think I’m doing well,” while Cormac shared, “I know that I did well on my first year tests and now I’m in higher maths.” Reflecting the awareness and high stakes nature of these tests, Cormac added, “... and the people who didn’t do as well are in lower.” Such a reflections reveal how formal assessments were beginning to influence their identity within a streamed context. However, such positive perspectives were limited across the narratives, with others appearing to struggle. Gráinne shared that her move to Second Year has coincided with a downturn in her relationship with mathematics, with tests having a significant impact on this positioning, “I don’t think I can do it as well as I used to. Like I find it harder now and I don’t do as well in tests and stuff like that.”

An emerging awareness of future assessment milestones, especially the Junior Certificate, added a new dimension to how students were beginning to perceive mathematics. While the exam itself was still over a year away, several students referred to the pressure it introduced. Narratives contained instances in which teachers began to signal rising expectations and an accompanying accelerated pace of learning. Niamh, for instance, explained, “She told us that we have to like, get through more this year because next year is when we have the Junior Cert.” Although not yet fully internalised, this anticipation contributed to a growing sense of seriousness and urgency around mathematics, subtly shaping students’ views of what mathematical learning looked like.

Finally, peer comparisons also remained present at this stage. Patrick noted that stronger relationships with classmates made him feel “more comfortable” in class, while Aoife explained that friends often helped each other with homework or when confused. While social comparison remained a factor, it was complemented by collaborative coping strategies in some cases.

### ***6.3.5 Summary***

Across the transition, assessment and peer comparison appeared very influential in shaping students’ mathematical identity journeys. In Sixth Class, there was a high level of awareness of standardised tests. While significant for students, they were rarely perceived as stressful. The shift to First Year brought a sharp increase in the frequency and perceived stakes of assessment, prompting concern about performance and study habits. By the end of First Year and into Second Year, students’ narratives revealed how assessment outcomes and comparisons with peers began to shape how they understood their abilities and positioned themselves within

the mathematics classroom. These influences were particularly acute when streaming occurred at the beginning of Second Year, where test results directly affected students' placement in higher- or ordinary-level classes. Although some students found confidence through achievement, others expressed growing pressure and doubt. Social dynamics such as peer comparison, informal rankings and collaborative support added further layers of complexity, showing how academic and interpersonal experiences became deeply entwined. Overall, the theme highlights how assessment is experienced as a socially mediated process with powerful influences on students' mathematical identities.

## 6.4 Conclusion

This chapter has drawn on specific excerpts from students' narratives associated with their PJGs. Although these reflections represent just one part of the broader interviews, they offer powerful insight into how students make sense of their experiences and relate to mathematics learning over time. Across the three themes presented, the analysis highlights how mathematical identity is shaped through a dynamic interplay of pedagogical, cognitive and social factors. In the first theme, the role of the teacher and their pedagogical approaches emerged as a central influence. Students repeatedly foregrounded the importance of clear explanations, support and interactive or collaborative learning experiences. Positive relationships with teachers were associated with confidence and engagement, while shifts in teaching style and a lack of clarity often contributed to confusion and a decline on their PJGs.

The second theme examined how students negotiated difficulty and challenge. Although most students experienced periods of struggle, the impact on their mathematical identity varied significantly depending on the presence of support and the pacing of learning. The data revealed that it was not always the perceived difficulty itself that was destabilising, but how that difficulty was framed and navigated. In the small number of cases where students felt equipped to manage new concepts, they sometimes viewed challenge as a motivator. However, when they felt isolated or overwhelmed, their confidence waned and this had a noted impact on their mathematical identity.

Finally, the last theme illustrated the growing significance of assessment and peer comparison. Generally, what began as a relatively benign experience in Sixth Class which centred on standardised tests, became a more intense and frequent feature of post-primary life. By the end of First Year and into Second Year, test results and peer comparisons were strongly shaping students' relationships with mathematics. At this time, assessment operated as both a formal

and informal mechanism of social positioning, emphasising the performative aspect of mathematical learning in the post-primary context.

The findings across all three themes highlight that there were a number of key factors that students had to negotiate. Responding to shifting classroom dynamics, changing expectations and evolving self-perceptions all arose prominently. The analysis also affirmed the value of examining these moments of reflection following the scoring of students' PJGs. They narrated their own journey and the influences on it, allowing me to get a close up on what did influence and feed into their negotiations at that time. Their reflections were shaped by first-hand experience and were powerfully expressed in students' own words.

# Chapter 7: Discussion

## 7.1 Introduction

The transition from primary to post-primary school marks a key time in a student's educational journey. Mathematics, as a core subject, often reflects the broader challenges and opportunities students face during this transition. This study sought to explore these dynamics through the lens of students' mathematical identity.

The research questions guiding this study were:

1. What is the nature of the mathematical transition students undertake as they move from primary to post-primary school?
2. What do students' mathematical identity journeys look like across the transition journey from primary to post-primary?
3. What factors influence students' mathematical identity during the transition from primary to post-primary school?

To address these questions, the study adopted a qualitative longitudinal design, using semi-structured interviews and personal journey graphs (PJGs) to gather the narratives of 17 students. The data were analysed using a dual approach of thematic analysis and a voice-centred relational analysis, via the Listening Guide. This illuminated the identity-based dimensions of students' stories and journeys. Importantly, it allowed for a textured understanding of how mathematical identity is negotiated during the transition. This chapter interprets the findings of the study in light of the research questions, the theoretical and conceptual frameworks. Following a brief overview of the main findings, it then situates them alongside existing literature. Presented under the research questions, the interpretation of the findings aims to illuminate their significance and explore their broader context.

## 7.2 Summary of main findings

By examining data from the semi-structured interviews and PJGs, the study uncovered key insights into the nature of the transition and the factors that influence students' relationships with mathematics during this time. A significant finding was the diversity in students' identity journeys, as reflected in three distinct trajectory clusters of the PJGs: stable trajectories, recovery from struggles and standout peaks. Students in the "stable" group remained relatively consistent in their relationship with mathematics, with little variation in their PJG scores. Those in the "recovery" group experienced a noticeable dip, often early in First Year,

followed by a return to or improvement in their PJG scores. The “standout” peaks cluster highlighted a particular peak in their PJG. To explore the complexity underlying these trajectories, three students were selected for analysis using the Listening Guide. Each represented one of the three clusters and offered a deeper lens into the types of mathematical identity journeys the students underwent.

Ciarán demonstrated a confident and engaged relationship with mathematics, grounded in a productive disposition and enjoyment of challenge in primary school. However, his move to post-primary featured different challenges. When the level of challenge exceeded his comfort zone, his confidence faltered. The increased emphasis on assessment was also seen to provoke questioning and negotiation of his mathematical identity. Meanwhile, Caoimhe entered post-primary school as a confident mathematics learner, but her identity was disrupted by unfamiliar pedagogical practices, changes in classroom dynamics and an increased focus on assessment. However, with time, Caoimhe regained her sense of capability, reflecting an ability to adapt and reframe her relationship with mathematics. Finally, Saoirse’s mathematical identity revealed a persistent emphasis on speed and accuracy as measures of success. Her previous positive associations with mathematics in primary school were challenged across the transition. Her perception of the difficulty of Algebra and disruptions associated with mathematics teachers left her feeling uncertain. Her narratives particularly highlighted the emotional dimension of mathematical identity.

Across the thematic analysis of narrative excerpts of all students, the findings highlight the interplay of personal, social and structural factors in impacting their mathematical identities. The role of the teacher and classroom environment were seen as particularly influential, with clear explanations and supportive pedagogical practices seen to foster positive dispositions. On the other hand, disruptions to routine, a heightened focus on assessment or rigid pedagogical styles often posed challenges for students and provoked self-questioning. The findings highlight the primary to post-primary transition as a time of vulnerability and opportunity. Students responded in different ways. While all experienced disruption, some maintained or even strengthened their positive disposition toward mathematics, whereas others encountered greater uncertainty and instability in their learning.

### 7.3 What is the nature of the mathematical transition students undertake as they move from primary to post-primary school?

Moving from primary to post-primary school marked a period of notable change for the students in this study. The findings in this study show that these students’ experiences were

marked by significant academic and social changes. Focusing on the first research question, this section examines the nature of the transition that students undertook.

### *7.3.1 A highly complex time*

As previously highlighted in Chapter 2, the transition can be viewed as a process rather than a single, one-time event (e.g. Smyth et al., 2004). The findings from this study reinforce this view that the transition is a multi-dimensional process, involving academic, social and emotional adjustments that unfold over time. No student in the study experienced the transition in a linear, simple way. Each had their own unique experiences, shaped by interactions with peers, teachers and the new learning environment. In the same way, their mathematical identities did not exist in a stable or predictable state, but were influenced by many factors that required the students to negotiate their view of self. These negotiations were shaped by a complex interplay of personal beliefs, social dynamics, classroom practices, learning demands and broader institutional structures such as assessment and streaming. The students' PJGs offered a particularly valuable data source, providing a vivid visual representation of their transition. They revealed that identity trajectories were rarely smooth or consistent. When interpreted alongside the students' narrative accounts, the graphs illustrated how mathematical identity was shaped by moments of disruption, adjustment and growth, highlighting the non-linear and context dependent nature of the transition process.

The complexity of the transition was further reflected in the contrapuntal voices captured using the Listening Guide. For example, Ciarán's voice of confidence presented in his early enthusiasm and willingness to embrace challenge gave way to self-doubt when the level of difficulty and pace intensified. In contrast, Caoimhe's voice of doubt was gradually tempered by moments of adaptation and regained confidence, particularly when she felt better supported. These emphasise the layered and non-linear nature of the transition process. The interplay between the contrapuntal voices revealed the challenges and also the resilience and adaptability of students as they negotiate their identities in response to their new environments. These voices also raised the emotional dimension of the transition process. Across the findings there was a wide range of emotions that students experienced. In keeping with previous research (e.g. Jindal-Snape & Cantali, 2019), anticipatory emotions were evident in the earlier interviews, with the students conveying a sense of apprehension, curiosity and, to a lesser extent, excitement. As evidenced in the Listening Guide, strong disruptive emotions were also present, in the form of confusion, frustration, disappointment and overwhelm. Linked with their experiences of post-primary school, students also had instances of pride, relief and hope, while interestingly a more

silent emotion of acceptance was picked up in several narratives. This emotional dimension was particularly important for students' mathematical identity which will be discussed further under the next research question.

Research has increasingly emphasised the multi-layered nature of the transition process. Recent research in the Irish space has identified concerns of students relating to social, academic and structural changes as they navigate the transition (Martinez-Sainz et al., 2025). Interestingly, in examining mathematics and science learning across the primary to post-primary transition, Kaur and colleagues (2022) highlight the intricate nature of the transition and emphasise that no single factor determines students' experiences. The transition is shaped instead by the interplay of structural, relational and individual elements. This aligns with the perspective outlined in Chapter 2, which foregrounded the evolving practices, discourses and relationships that students must navigate as part of their transition. Such a complexity is evident across the students' narratives, where wider structural influences often intersected with personal attributes. Indeed, a key insight from the study is how these elements interact dynamically across the transition. We can see that Ciaran's identity was initially shaped by individual resilience and enthusiasm, which was later destabilised by institutional factors, primarily assessment pressures and perceived changes in the level of difficulty experienced. Caoimhe's identity trajectory also exemplifies such an interaction, albeit somewhat differently. Her experience highlights the shifting role of relational factors, as peer comparisons and teacher feedback first undermined, but later had a positive impact on her mathematical identity. These cases suggest that rather than viewing different factors as separate influences, it is their interaction over time that gives shape to the nature of transition.

### ***7.3.2 Stabilisation***

A key observation across the data was the extent of change encountered by the students. As discussed in Chapter 3, Nicholson's (1987) Transition Cycle provides a useful framework for understanding the broad stages students navigated from primary to post-primary school. The four phases - preparation, encounter, adjustment and stabilisation - offer a way of conceptualising transition not as a single moment but as a process that unfolds over time. In this study, students' mathematical experiences could be loosely aligned with these stages. Many began in Sixth Class with anticipation and mixed emotions, often expecting increased difficulty and independence. The encounter phase brought novelty and disruption, as students were met with an array of new experiences upon entering First Year. A notable number of students embraced this novelty, serving as an important reminder that the transition afforded some with

a very positive opportunity. The adjustment phase was marked by both resilience and struggle, as students developed strategies to navigate learning demands and expectations. Finally, a form of stabilisation emerged in late First Year or early Second Year for the vast majority of students. However, for a small number of students, this stabilisation appeared to remain elusive.

Nicholson's model does not present transition as strictly linear. It acknowledges that individuals may revisit earlier stages as they encounter new challenges (Nicholson & West, 1988). This flexibility is useful in explaining the variations in students' adjustment processes in this study. However, while the model allows for some recursion, it assumes that stabilisation represents an endpoint, a time when students have adjusted and no longer experience the disruptions of transition. While expecting this point to arrive by the end of First Year, this did not transpire for all students. For some, a sense of stability only emerged at the start of Second Year, while others continued to carry unresolved aspects of the transition beyond this point. Admittedly, some of the challenges shared in the final wave of interviews reflect the move to Second Year, which is in itself a new phase of transition. However, the findings suggest that, for some, these challenges were not entirely distinct from earlier transitional difficulties. Rather than marking a new beginning, Second Year often involved revisiting unresolved aspects of the transition. Disruptions such as expectations around assessment, comparison dynamics or difficulty with mathematical content like Algebra, all of which initially emerged in First Year, once again began to surface or intensify. In this sense, these experiences suggest that transition is not necessarily complete by the end of First Year and that stabilisation may be partial or provisional in nature. Importantly, for some, where stabilisation did occur, it was not simply a return to the pre-existing relationship of before, but instead evolved, after new ways of engaging with mathematics were embraced. For these students, the transition offered not only disruption, but also moments of renewed engagement and subtle shifts in how they related to mathematics.

These findings suggest that while Nicholson's framework offers a useful starting point, its application to younger learners and to learning-specific transitions, such as the primary to post-primary one, may be limited. It risks underplaying the recursive, affective and relational complexity of this transition and applying its stages to periods, even approximate periods, across the transition may not be helpful in capturing the journeys of all students. Furthermore, a key consideration here is the time frame typically used to study the transition process. The literature predominantly focuses on the transition process around a period spanning from the end of Sixth Class to the end of First Year (e.g. Smyth et al., 2004). Of note, in a study conducted in New Zealand, Kennedy and Cox (2008) proposed that the transition from primary to post-primary

should be viewed as a process, a one they described as taking “an often difficult-to-determine length of time” (p. 251). This reverberates strongly with the findings above, and would indicate that a more flexible view of the transition is required.

### *7.3.3 A series of mini-transitions*

For the students in this study, the transition was not experienced as a single, definitive event but rather as a prolonged period of adjustment and readjustment. Their journeys can be understood as a series of interconnected mini-transitions, each bringing distinct academic, social, structural or emotional shifts that required ongoing adaptation. At times, these changes overlapped, challenging students on multiple fronts. Significant changes included; adapting to new teachers, encountering new pedagogical approaches, shifts in pace, increases in perceived learning, coping with changes in peer groups and adjusting to shifting assessment practices. These changes often demanded personal and academic adjustments, which emerged clearly through the students’ narratives. In this way, the transition could be best viewed not as a single process, but as a series of smaller, overlapping processes of change.

A key shift for students involved the move from a single-teacher environment to multiple subject teachers. For many, this was seen to disrupt familiar routines and required them to navigate different pedagogical approaches and expectations. This was accompanied by the introduction of a more rigid timetable, which also shaped students’ early transition experiences. Several students reported struggling to manage their time and adapt to longer but less frequent mathematics classes. Others, however, welcomed the novelty of timetabling mathematics learning, claiming their primary experiences of learning mathematics often appeared too long. Similarly, learning from specialist mathematics teachers offered some new opportunities and insights that were welcomed. Jindal-Snape (2009) describes such transitions as multi-dimensional, requiring students to adjust simultaneously to academic, social and organisational shifts. This was particularly evident in cases where students encountered different pedagogical approaches from different teachers, leading to uncertainty around expected methods and learning strategies. Zeidner (2007) further highlights that such structural changes can increase academic anxiety, especially when students are expected to self-regulate their learning to a greater extent than they have in the past.

Learning continuity also featured prominently. While a small number of students perceived alignment between primary and post-primary mathematics, most described changes in the difficulty, pace and focus of learning. Importantly, the students did not frame their experiences in terms of curriculum continuity but instead described them in terms of shifts in

challenge and expectations that did not align. For many, encountering Algebra represented a pivotal mini-transition. It brought knowledge gaps to the surface and, for some, introduced a persistent sense of struggle. Others expressed frustration with topics they found overly repetitive, which diminished their motivation and sometimes caused boredom, something echoed in previous research (Ryan et al., 2024).

Assessment practices represented another significant point of change. Students adapted to more frequent formal testing and an intensified focus on performance, which shifted how success in mathematics was defined. This change was particularly impactful for those who already equated their mathematical ability with test results, increasing pressure and reinforcing peer comparisons (Ryan & Patrick, 2001). Alongside this, students described having to adjust to new classroom norms, including expectations for more study and note-taking. These practices, almost always new to the students, required a period of adjustment. After time, they were experienced as either empowering or disorienting, depending mainly on students' overall adjustment to post-primary school and the level of support they felt was provided in the mathematics classroom.

Although the term "mini-transitions" is not yet widely established in the literature, the notion that students undergo multiple, overlapping transitions throughout their educational journey is well supported. Recent research in the Scotland system revealed students experiencing "multiple transitions in different domains" and "different contexts" (Jindal-Snape et al., 2023, p.29), with both social and academic factors cited. Taking account of the examples above, they reinforce the idea that transition is not singular, but multi-dimensional and shaped by interconnected academic, social and structural changes (Jindal-Snape, 2016). This study brings forward the concept of mini-transitions as a useful way to understand how students navigate the broader move from primary to post-primary school. By tracing students' accounts over a 20 month period, it highlighted how these smaller shifts actively influence how students come to see themselves as mathematics learners during the transition.

#### *7.3.4 Silent acceptance*

A notable finding in this study was the quiet acceptance with which students approached change. Even when they experienced confusion or difficulty, they seldom expressed dissatisfaction or questioned the changes they encountered. For many students, the transition to post-primary school was accompanied by more teacher-led learning and reduced hands-on collaborative learning. Across the interviews, many students picked up on these changes and spoke of a preference for the latter. However, while this was noticed by students, it was rarely

criticised. Some students voiced mild dissatisfaction or made nostalgic comparisons to mathematics learning in primary school, but for most, they adjusted quietly. The extent of this silent adaptation was perhaps surprising. It possibly reflects the expectations students held of being treated more like mature learners (Galton et al., 2003) and therefore were more willing to accept changes as part of their educational growing up journey. It could also point to the position of power often held in mathematics classrooms, where the teacher typically controls the what and how of the learning process (Boaler, 2000). While not explicitly present in literature on the transition, it does coincide with findings from a study involving 13-14 year old post-primary students in England (Nardi & Steward, 2003). Here the authors found that engagement by students in the mathematics classroom in early post-primary school came out of a sense of “professional obligation and under school or parental pressure” (p. 361). The students themselves appeared to gain very little enjoyment and instead found learning mathematics as a tedious and isolating affair.

This dynamic was evident across findings from the thematic analysis and the Listening Guide analysis. For instance, Saoirse remarked that they no longer used whiteboards or did group work. However, she simply accepted the new structure as part of post-primary school life. Ciarán similarly noted that classroom tasks had become more individual and book-based, though he rarely challenged or questioned this shift. Cara described mathematics as “more kind of writing... not much hands-on” and Cormac observed, “he just gives us work to do and we just end up doing that”, capturing the passivity with which many students approached the different classroom routines. A clear example of this could be seen in Caoimhe’s reluctant adoption of her new teacher’s strategies. Despite feeling her previous methods were more effective, she adjusted without voicing her concerns, motivated by the pressure of upcoming assessments. The examples suggest that students internalised the new norms and expectations of post-primary mathematics as unavoidable, even when they conflicted with their preferred ways of learning. There were no instances of the students discussing the changes with their teachers or with their peers. This quiet compliance was seen to have consequences, especially for their mathematical identity, something that will be discussed further later in this chapter. It also raises important questions about student agency and voice, as well as the power dynamics, within mathematics classrooms. It situates students as passive receivers of learning (Boaler & Greeno, 2000) and conveys important messages about the nature of mathematics learning itself.

### 7.3.5 Summary

This section has explored the nature of the mathematical transition students undertake as they move from primary to post-primary school. It has highlighted this time as a complex, uneven and evolving process of adaptation. The transition is marked by a series of ‘mini-transitions’, including adjusting to new pedagogical approaches, assessment demands, discontinuity in learning and perceptions of difficulty. These “mini-transitions” frequently overlapped, leaving students to adjust to multiple changes at once. While some adapted with relative ease, others experienced recurring disruption, with signs of instability continuing well into Second Year.

A particularly revealing finding was students’ widespread acceptance of changes in terms of pedagogy and learning. The move to post-primary was often accompanied by more passive, teacher-led classroom experiences. Even when these conflicted with their prior learning experiences, the students rarely questioned it or felt aggrieved. This suggests a strong normalisation of classroom power hierarchies, in which adaptation is expected but negotiation is not. The quiet compliance of the students also raises questions on how schools structure participation and agency in mathematics learning. In the next section, attention turns to the consequences of these experiences for students’ mathematical identities.

## 7.4 What do students’ mathematical identity journeys look like across the transition journey from primary to post-primary?

This section addresses the second research question and turns inward to examine how students came to understand themselves as mathematics learners across the transition. As outlined in Chapter 3, this study conceptualises mathematical identity as malleable, socially constructed and represented through narratives. It was understood as an evolving narrative, shaped by students’ experiences of learning, interactions with others and the meanings they attached to success, struggle and belonging in mathematics. Such a view is grounded in sociocultural perspectives (e.g. Wenger, 1998; Sfard & Prusak, 2005).

This section draws on both the thematic analysis and Listening Guide cases to explore the evolving and multi-layered texture of students’ mathematical identity journeys. It begins by examining overall patterns of stability and change using the PJG clusters, then moves to explore how students reflected on their identity over time. Finally, it considers how multiple, sometimes conflicting, voices emerged in their narratives. While the next section will focus more specifically on the factors that influenced these developments, the emphasis here is on how students

experienced changes in their mathematical identity and how these changes unfolded during the transition.

#### *7.4.1 Patterns of continuity and change*

Students' mathematical identity journeys across the transition revealed a broad range of trajectories, from stability and quiet confidence to disruption, recovery and, for some, lingering uncertainty. While some students maintained a consistent sense of themselves as mathematics learners, others engaged in active identity negotiation in response to changing expectations, environments and emotional experiences (Hall et al., 2018; Lutovac & Kaasila, 2011). Several students appeared to carry a relatively stable sense of mathematical identity from primary into post-primary school. These students described themselves as comfortable with mathematics, generally confident in their abilities and able to adjust to new routines without significant disruption. For students like Aoife and Cormac, their sense of self was grounded in consistent experiences of success and support. These were seen to be reinforced by alignment between their expectations and the post-primary learning environment, and where their prior knowledge was recognised and activated in a meaningful way.

However, a significant number of students described identity journeys marked by more visible fluctuations and change. These students often experienced a dip in confidence or sense of belonging early in First Year, followed in some cases by recovery and re-engagement. The PJGs offered insight into these shifts, illustrating moments of challenge and also students' efforts to make sense of their changing relationship with mathematics. Ciarán, for instance, began post-primary school with confidence but faced a drop when he encountered new levels of difficulty, especially in Algebra and assessment. These disruptions prompted him to re-evaluate whether he still fit within the category of a "maths person", an example of what Andersson et al. (2015) describe as identity negotiation occurring through tensions between previous experience and current challenge. Similarly, Caoimhe's identity journey revealed a shift from self-assurance to self-questioning, brought about by assessment pressures and deeper peer comparisons. Her gradual recovery reflects a process of narrative repositioning, a form of identity negotiation in which she shifted how she saw herself in relation to the classroom norms and expectations (Heyd-Metzuyanim & Sfard, 2012). This negotiation did not mark a departure from her earlier identity, but rather an evolution and a redefined sense of success rooted in resilience and effort.

Some students described sharp moments of success or clarity in their narratives that were often accompanied by peaks in their PJGs. These peaks were not always sustained. For example, Saoirse entered post-primary school with a confident mathematical identity, grounded

in her prior success and enjoyment of interactive mathematical learning experiences in primary school. This early confidence was reinforced by her initial ease with new learning topics. However, as mathematics learning became more individualised and assessment-focused, her sense of self as a mathematical learner was unsettled. The reduction in collaborative learning and increased focus on note-taking and assessments challenged her sense of competence. Saoirse's journey reflects a shift from confidence to self-doubt, highlighting the fragility of mathematical identity when the learning environment no longer affirms one's preferred ways of engaging. Her narratives illustrate what Holland et al. (1998) describe as a self-positioning that is shaped by both past narratives and the new "figured worlds" they enter. Sometimes, this move can present a tension that can prompt either adjustment or rupture. In Saoirse's case, a quieter kind of disorientation was evident that led to a slow erosion of her belief in her own ability, as she tried to find her place within the new structures of post-primary school.

The longitudinal nature of this study allowed for a close exploration of how students narrate and experience identity shifts in real time. While previous research (e.g. Pettersen & Xenofontos, 2023) has examined identity shifts, much of that literature emphasises static identity categories rather than the lived, moment-to-moment experience of transition. The patterns above suggest that mathematical identity negotiation is not linear or always mapped onto prior performance. Instead, it unfolds through cycles of oscillation and disruption as students respond to new demands and learning environments. The PJGs helped illuminate external patterns of change, but it was the students' narratives that revealed the emotional and cognitive effort involved in identity negotiation.

These patterns of continuity and change resonate in some respects with, but also differ from, Darragh's (2013; 2014; 2016) work on mathematics identity at the primary to post-primary transition. As previously discussed in Chapter 2, Darragh's research, drawing on New Zealand students' experiences, foregrounds the role of confidence and belonging in mathematics classrooms and positions identity negotiation as a performance, shaped by how learners present themselves and are recognised by others in the moment. While my findings similarly emphasise the relational and situational nature of identity, my analysis does not frame identity solely through a performance lens. Instead, I draw on a sociocultural–narrative perspective that attends equally to students' internalised self-concepts, emotional trajectories and the historical continuity of their experiences. The longitudinal, multi-wave design of my study allowed for the capture of identity shifts over two full years, revealing not only moments of disruption and adaptation, but also a more "quiet" form of acceptance that Darragh does not explicitly identify. The use of PJGs alongside narrative interviews provided a visual–narrative synthesis that

illuminated the non-linear trajectories of students' mathematical relationships, complementing but also deepening the more thematic lens applied in Darragh's work. Finally, my analysis identified the interplay of contrapuntal voices, such as confidence, doubt, and relational influences, as central to understanding identity negotiation, offering an additional layer of insight into the emotional complexity of the transition.

#### *7.4.2 Identity as internal negotiation*

The students' mathematical identity journeys across the transition were marked by significant internal questioning and meaning making. The transition to new learning environments can prompt students to question their prior beliefs and expectations about themselves as learners (Källberg, 2018). They reflect on their own positioning and perceived level of success or failure, as their mathematical identity is renegotiated through ongoing experiences and reflections. Students' mathematical identity journeys were shaped by how the students internally processed and interpreted the experiences they encountered. Across the data, students engaged in an ongoing negotiation of who they were as mathematics learners, drawing on both past narratives and new realities to make sense of who they are becoming. These negotiations were often emotionally charged and situated in moments of disruption. In exploring the findings revealed from the Listening Guide, we can see a number of examples of this.

This kind of identity negotiation is evident in Ciarán's account, particularly in his response to the challenges of Algebra. His early confidence, rooted in a productive disposition and enjoyment of challenge, gave way to uncertainty. The disruption prompted internal questioning around his ability and place within mathematics, as he asked was he still "good at maths"? Could he still belong in a space that felt increasingly difficult to navigate? The process of identity negotiation for Ciarán was not dramatic in tone, but was persistent and self-reflective. His tone resembled a quiet re-evaluation of his competence and fit within mathematics learning. Meanwhile, for Saoirse, her internal negotiation took a different shape. Her early sense of confidence was closely tied to familiarity, speed and peer comparisons that provided her with a sense of security. She began to doubt her place when more individualised, teacher-led learning was introduced in the post-primary classroom and the collaborative structures she had valued were removed. Her narrative was marked by repeated comparisons that no longer provided her with that same level of security. Additionally, internalised standards and a longing for affirmation began to emerge which contributed to an evolving view of herself as a learner. Saoirse's sense of who she was as a learner was challenged by a new reality, leading to an

ongoing process of internal alignment. Saoirse's alignment was marked by tension as she tried to balance new demands with internal questioning. Finally, Caoimhe's journey reflects a more deliberate repositioning of her identity over time. Initially focused on performance outcomes, she associated success with high test scores and correct answers. These were all comfortably achieved in primary school. When faced with difficulty and unexpected results in post-primary school, she began to redefine what counted as success. Rather than discarding her previous identity, she reframed it, shifting toward a narrative of resilience and effort. Caoimhe internally negotiated an adjustment that saw her align with new norms around assessment and study.

Across all three cases, mathematical identity was actively negotiated through reflection and reinterpretation. While some students displayed more overt signs of struggle, most were engaged in quieter, ongoing efforts to make sense of who they were becoming as mathematics learners in the face of new expectations. These negotiations were not solely cognitive but deeply affective, marked by vulnerability and comparison. For many, this internal work involved reconciling earlier beliefs about competence and belonging with the unfamiliar norms of post-primary mathematics. These processes were not always cleanly resolved. For some students, tension persisted, surfacing in the form of hesitancy, emotional distancing or a tentative reimagining of what it meant to succeed in mathematics.

### *7.4.3 Contrapuntal voices and emotional texture*

The Listening Guide analysis revealed the contrapuntal voices that captured the emotional and relational layers of students' identity work. These voices captured the emotional and relational complexity of identity work. They were not always unified or consistent as students voiced confidence and doubt, belonging and exclusion, pride and uncertainty, sometimes within the same interview or even within the same narrative. These voices offered insight into how students were positioning themselves in relation to mathematics and how these positionings felt. Listening to the interplay of voices makes visible identity negotiation in action and also the emotional texture of what it means to navigate mathematics during the transition.

Ciarán's narrative illustrates the layered and dialogic nature of identity negotiation. Early interviews were shaped by a confident voice that was grounded in enjoyment of challenge and a view of mathematics as something to "figure out." His PJG reflected this productive stance, with high and steady scores across Sixth Class. However, as the demands of post-primary mathematics increased, a quieter voice of doubt emerged. His tone shifted to uncertainty. Rather than replacing his earlier confidence, this voice of uncertainty coexisted with it. Importantly, Ciarán's identity work did not involve withdrawal or resignation. His I poems

captured a repeated, albeit decreased, insistence on effort. As Hall et al. (2018) note, identity is not simply what one says about oneself, but how one narrates competing feelings and tensions. Ciarán's story exemplifies this complexity. He worked through the emotional challenge of reconciling his past confidence with new uncertainties and challenges.

Caoimhe entered post-primary school with a strong record of success, her initial self-positioning was one of high-achieving certainty. However, when she encountered more regular and structured assessment, as well as increasing difficulty, her sense of confidence dropped. Notably when her test outcomes no longer met her expectations, her identity fractured somewhat. The voice of doubt that surfaced was not only about ability, but about her place in mathematics more broadly. However, with time her identity evolved to accommodate these new realities. She engaged in a kind of realignment, adjusting her definitions of success to include effort and persistence. This repositioning reflects what Sfard and Prusak (2005) describe as an ongoing re-authoring of identity where identities are adjusted in light of new participation experiences. Caoimhe drew more on a voice of resilience, not fully erasing her need for affirmation, but redefining what it meant to do well. As Caoimhe aligned herself within the new norms of the mathematics classroom (Cobb et al., 2009), she began to feel success once more. In a way, Caoimhe's identity journey reveals a form of an effort to remain positioned within "what counts" as being successful at mathematics in the classroom.

Saoirse's narrative brings to light the social nature of identity negotiation. Her identity in Sixth Class was informed by positive prior experiences, speed and perceived success in primary school. Her early confidence in First Year proved fragile as the new learning environment introduced increased performance expectations. As collaborative practices gave way to textbook-based learning and as assessment became more frequent and public, Saoirse's view-of-self came under pressure. A voice of doubt emerged, shaped by perceived levels of difficulty, particularly with Algebra, and also by her growing awareness of peer comparisons. In her narratives and I poems, this was often voiced through the language of "they" and "you," reflecting an external gaze and self-evaluation through the eyes of others. This strongly reinforces how mathematical identity is shaped through participation in social contexts and relationships with others (Lave & Wenger, 1991; Holland et al., 1998). Alongside this, a voice of silent compliance threaded through Saoirse's narrative. Though she expressed quiet dissatisfaction with less interactive classroom methods, she rarely blamed her surroundings, instead adapting to the new norms. This was a struggle for her, as she worked to shift herself in relation to the new norms and expectations (Heyd-Metzuyanim & Sfard, 2012), especially as they were seen to undermine her confidence and sense of stability.

The contrapuntal voices of Ciarán, Caoimhe and Saoirse demonstrate mathematical identity as a dynamic negotiated entity. Their narratives show that identity shifts can reflect how students negotiated their responses to new demands. The texture of this work reveals that identity negotiation is rarely dramatic. It unfolds over time as a form of emotional effort, requiring students to adjust and adapt. This can include changing how they define success and what they are willing to suppress in order to belong and succeed in new structures. The layered and conflicting voices complicate any singular reading of students' mathematical identity. They do, however, highlight the transition process as a period of deep identity work, in which students are figuring out how to be mathematics learners in relation to their new surroundings.

#### **7.4.4 Summary**

This section has explored students' mathematical identity journeys across the transition, highlighting them as complex and emotionally textured. Students in the study actively negotiated their identities in response to shifting classroom norms and new demands. Some maintained a stable sense of themselves as mathematics learners, while others experienced more fragmented trajectories. Many of the journeys were marked by confidence, tension, doubt, recovery and redefinition. Some of these negotiations were not always externally visible and unfolded quietly, through internal dialogue.

The findings reveal how students' mathematical identity was narrated through multiple, sometimes conflicting voices. Confidence and doubt, belonging and disorientation, resilience and self-comparison, all coexisting within their narratives. These voices illustrate that identity is not simply a product of prior attainment or external validation, but is actively negotiated in response to the experiences encountered. As the students figured out how to be mathematics learners in a new environment, they did so through acts of sense-making. The next section now turns to the factors that influenced their mathematical identity.

### **7.5 What factors influence students' mathematical identities during the transition from primary to post-primary school?**

Related to the previous question examining the mathematical identity journeys of students, the final research question sought to explore the factors that influence these journeys. While the previous section focused on how students negotiated their mathematical identity, this does not unfold in a vacuum. It is shaped through participation in specific contexts, namely the mathematics classroom.

Students' narratives revealed that their emerging sense of self in mathematics was deeply shaped by how they were taught, assessed, compared and guided. The following sections explore four key influences that emerged as particularly significant across the dataset: (1) the role of the teacher, (2) the power of assessment, (3) learning continuity and (4) peer comparisons. These domains shaped what students experienced and how they came to understand who they were in relation to mathematics.

### *7.5.1 The role of the teacher*

Among the most powerful influences on students' mathematical identity during transition was the teacher. Students positioned teachers as central to their experience of mathematics and in shaping their overall relationship with the subject. According to the students, teachers shaped the tone of the classroom, the expectations on them and what considered success. As described previously, mathematical identity is inherently situated within the social and school-based contexts in which learning occurs (Wenger, 1998; Sfard & Prusak, 2005). Students' interactions with teachers in these contexts had an influence on their experience and their evolving sense of identity.

Several of those interviewed emphasised the significance of teacher clarity and approachability. Students' mathematical identity appeared supported through feeling recognised, heard and understood as a learner. Ciarán drew confidence from teachers who framed mathematics as something to explore and reason through. His early confidence was underpinned by teachers who presented challenge as doable and effort as worthwhile. By contrast, Caoimhe's early dip in confidence was tied to moments of perceived dismissal, where her efforts to explain her own methods were overridden by a pressure to conform to a particular way of working. Her sense of being "wrong" was not just about error, but about not being heard. It triggered an identity shift toward self-doubt and a subtle repositioning in how she saw herself as a mathematics learner. Such a dynamic foregrounds the role of recognition and discursive participation in one's mathematical identity (Black et al., 2010). The authority of the teacher was also at play. In this example, they determined what counted as important in the mathematics classrooms (Cobb et al., 2009), to the detriment of the student's own agency and ownership of their learning.

Saoirse's experience of having multiple mathematics teachers during First Year highlighted another important influence; consistency. For her, a lack of pedagogical continuity created confusion and frustration. As she encountered conflicting strategies from different teachers, she began to doubt her own understanding, which impacted her sense of belonging.

This echoes Hargreaves' (2001) argument that pedagogical stability fosters both engagement and trust, which are critical in maintaining a positive learning identity. Similarly, Jindal-Snape (2016) highlights that, when learning environments shift abruptly during transition, students' confidence and motivation are at risk. Once Saoirse gained a more consistent and supportive teacher in Second Year, her confidence was seen to stabilise. Instances where students did not feel supported in their learning led to a sense of disengagement and created internal insecurities about their relationship with mathematics. Additionally, the degree to which students felt safe to ask questions also emerged as a key factor in whether or not they felt accommodated. Indeed, teachers who fostered an open, collaborative learning environment supported students' sense of belonging and contributed towards a positive mathematical identity. Of relevance here is Sfard's (2008) distinction between acquisition and participation metaphors for learning that further illuminates the importance of teacher influence. While some teaching approaches focus on the acquisition of mathematical knowledge, others emphasise participation in mathematical practices. It was notable that across this study, students responded positively to experiences that prioritised active participation and collaboration. These were seen to contribute to students developing a more confident and resilient mathematical identity. However, it should also be noted that most students viewed the acquisition of mathematics knowledge as very important to them. This appeared to relate to their desire to achieve and reflected their understanding of what was valued within the mathematics classroom. Yet, when the learning environment became overly focused on acquisition, particularly when coupled with a strong emphasis on assessment, risks emerged. Students were placed in a vulnerable position where their confidence and sense of worth as learners could be undermined. When students encountered difficulties in acquiring knowledge in such contexts, they often disengaged, with their narratives revealing a sense of overwhelm.

Notwithstanding the literature featuring the role of teachers as an important factor, the extent to which it was highlighted by students as central to their overall experience of the transition was perhaps surprising. Students experienced different pedagogical approaches and also different ways to experience success. Some were given the opportunity to explore and problem solve, while others were positioned as silent reproducers of selected methods. These invitations carried implications for the students' mathematical identity, shaping how they saw their capabilities and their place in the classroom. Accordingly, teachers were seen as central figures in the learning process and, importantly, as powerful mediators of students' identity.

### *7.5.2 The power of assessment*

Assessment emerged across the data as another force in shaping students' mathematical identity. For many, the move to post-primary school brought a shift from infrequent testing to a more regular cycle of classroom assessments, usually tied to chapters or topics. This shift was usually accompanied by a change in how success was measured and experienced, and for many was seen to tilt the balance from learning to judgment. Many students' narratives revealed that assessment became a marker of their identity.

Caoimhe's experience offers a clear example. She entered post-primary school with a strong history of high achievement and had framed her mathematical identity around this. However, when her results began to fall short of her expectations, her confidence faltered. The power of assessment here was a clear disruption to her long held narrative of success. These experiences prompted identity negotiation, shifting her understanding of success from one grounded in performance to one centred on effort and improvement. It was somewhat different for Saoirse. Assessment, for her, created a heightened sense of vulnerability. She often anticipated poor performance, even before she received her results, and framed her expectations in terms of what others would score and how she would compare. In her narratives, assessment became both a private and public event. In one way, she judged herself and then also imagined being judged by her peers. Assessment, in this instance, acts as a key site of visibility. Of relevance here is a study of middle school mathematics classrooms conducted by Ryan and Patrick (2001). They observed that the nature of many assessment practices in mathematics inherently promoted social comparison. Mathematics performance is often made public through classroom discussions or visible test results, which means that students are frequently aware of how their performance compares to others. In the present study, several students described how such visibility heightened their sense of vulnerability, especially when results were openly discussed. These moments, while sometimes motivating, also reinforced fixed hierarchies of competence and contributed to anxiety.

The thematic analysis revealed that assessment practices often acted as critical turning points in students' mathematical identity journeys. Emphasis on assessment and the associated pressure and stress, notably increased when students entered post-primary school. The pressure to achieve high test scores was significant across the data. Such high-stakes assessment environments can increase anxiety and create mathematics-related stress on students (Boaler, 2016). However, not all students experienced assessment as a threat. For a small number, particularly those with more stable trajectories, a series of consistent positive results served as

affirmations. For students like Cormac, they were seen to reinforce a sense of competence and belonging in post-primary school.

An important finding from the data related to assessment arose from the final two waves of interviews, as students prepared to complete First Year. The majority of students reported being aware that their performance in tests would determine their placement into higher- or ordinary-level mathematics for Second Year. In keeping with the discussion earlier in this chapter, the students generally accepted this as part of the process and offered very little in the way of protest against it. Additionally, there was little evidence of concern about the long-term implications of streaming amongst the students. This acceptance contrasts with concerns raised in the literature regarding the detrimental effects of ability grouping on students' mathematical identity, particularly for lower-attaining students (e.g. Francis et al., 2016). These practices risk constraining students' mathematical opportunities and contribute to the reinforcement of narrow, fixed views of ability.

Finally, in comparing the narratives describing assessment during their time in primary and post-primary school, interesting insights were revealed. In primary school, students typically described assessment as infrequent and familiar. Even the standardised tests, generally considered high stakes within research (e.g. O'Leary et al., 2019), were seen as less emotionally charged. This, may in part, be as a result of the students becoming accustomed to them by the time they were in Sixth Class. In contrast, post-primary assessments were portrayed as more frequent and consequential. Indeed the emotional weight of assessment in post-primary was a consistent theme. It often overshadowed students' broader learning experiences, narrowing their focus to outcomes rather than process. This dynamic reflects concerns raised by Black & Wiliam (1998), who argue that when summative assessment dominates classroom culture, it can distort learners' identity and shift their motivations toward external validation.

The findings revealed the important role that assessment plays in shaping students' mathematical identity. While it served as a source of affirmation for some at different stages, for many it became a site of vulnerability, with an overt focus on performance evident. As Boaler and Greeno (2000) argue, classrooms that privilege performance over understanding risk excluding those who do not consistently excel under such narrow measures. Although recent policy developments, such as the introduction of CBAs, as referred to in Chapter 2, aim to broaden assessment culture, it remains to be seen whether such initiatives will meaningfully reshape classroom practice. What the findings here make clear is that assessment operates as a powerful mechanism in terms of impacting students' mathematical identity.

### *7.5.3 Learning continuity*

As well as the teacher and assessment influences presented above, continuity in learning experiences played a key role in influencing students' mathematical identity. The extent to which learning appeared coherent, challenging or fragmented appeared frequently across the students' narratives and impacted their sense of competence. Key factors influencing this included having a consistent mathematics teacher and curriculum continuity, which often emerged in students' narratives as perceived gaps or repetition in mathematical learning.

Across the interviews, several students described frustration at revisiting topics they felt they had already mastered in primary school. These students questioned the relevance of early First Year learning, describing it as too easy or repetitive. Others, however, described abrupt increases in perceived difficulty, particularly when encountering Algebra. Despite its place on the primary school curriculum, many students perceived Algebra as entirely new. The sense of novelty and disorientation evident in the findings point to a misalignment in how Algebra is experienced by students across the transition. Several students reflected that greater exposure to Algebra in primary school would have eased their transition, offering a stronger bridge to post-primary expectations. Alongside this and more generally, students cited instances in which perceived difficulties, jumps and gaps were described in relation to learning continuity. Such discontinuities are considered an important determinant in students' sense of coherence and confidence in mathematics learning. Kaur et al. (2022) highlight that misalignment between primary and post-primary mathematics curriculum can lead to disengagement, as students either feel underwhelmed by repetitive content or overwhelmed by abrupt increases in difficulty. Greater cross-sectoral collaboration between primary and post-primary educators could mitigate some of these issues, ensuring that students transition with a stronger foundation and clearer expectations (Prendergast et al., 2019).

The emotional consequences of these perceived gaps were clear. Students who struggled with new content often internalised the difficulty, framing it as a personal failing rather than a shortfall of the system or schools. The result was a quiet erosion of confidence, sometimes compounded by a disengagement from learning. Conversely, students who encountered material at what they felt was a just-right level of challenge described a more stable and positive identity trajectory. For these students, logical progression in content was identity-affirming and reinforced students' sense of belonging within mathematics and the classroom.

Teacher continuity also emerged as an important factor in supporting learning continuity. Several students highlighted the stabilising effect of having the same teacher across the year, noting that familiarity with expectations and routines supported their learning. By contrast, mid-year teacher changes created a sense of instability. Some students described having to "learn mathematics all over again". At the heart of what mattered to students in this area was how they experienced the flow and fit of their prior mathematics learning. Whether the challenge was perceived as appropriate and whether prior learning was activated or ignored, shaped their ability to build a positive identity as mathematics learners.

#### *7.5.4 Peer comparisons*

Finally, peer dynamics played a subtle but powerful role in shaping students' mathematical identities during the transition. As students entered new classrooms and social environments, their sense of self in mathematics was increasingly formed in relation to others. As students in the study moved across the transition, they experienced a vast array of new encounters, including structures, learning environments, teachers and peers. Accompanying the arrival of new peers were novel social dynamics that students negotiated. Students frequently compared their performance on assessments and also their perceived understanding of learning. Perhaps the extent to which peer comparison unfolded across the narratives was not all that surprising given the age and stage of development of the students. During early adolescence, students become more sensitive to social comparisons and peer evaluations (Eccles & Roeser, 2009), which can significantly impact their motivation and academic self-concept.

The thematic analysis revealed that students' interactions with peers served as both a source of confidence and uncertainty. Some students described how positive peer interactions fostered a sense of belonging in the mathematics classroom. Collaborative learning environments, where they could discuss and problem-solve together, were frequently cited as experiences in primary school that reinforced their engagement. This aligns with Boaler and Greeno's (2000) work, which emphasises how mathematical discourse in the classroom can shape students' beliefs about their competence and identity. Several students found reassurance in working alongside peers, particularly in moments of difficulty, where peer explanations sometimes provided clarity that the teacher did not.

The analysis revealed a duality in how students responded to peer comparisons, with some finding it a motivation but for others it triggered self-doubt. Cormac, for example, used peer performance as a benchmark to push himself further, actively seeking challenges and setting personal goals based on classmates' success. His experience aligns with research

suggesting that peer comparisons, when framed positively, can foster motivation and engagement (e.g. Boaler, 2016). Peer interactions also became a basis for comparison that led some students to question their own competence. In the case of Saoirse, as discussed previously, these comparisons proved particularly destabilising. She questioned her own competence and struggled to position herself in the new class hierarchy of post-primary. She frequently referenced others' performance constructing her own identity through a comparative lens. Her narratives show how deeply peer comparisons shaped her moment-to-moment identity negotiations, reinforcing the role it plays across the transition.

### *7.5.5 Summary*

Many factors influenced and shaped the students' mathematical identities in this study. Across the narratives, teachers, assessment, peers and learning continuity were all highlighted as having particular significance. The role of the teacher emerged as central as a gatekeeper of stability and participation. The power they held in shaping classroom norms, the learning experiences they provided and the level of support offered was seen to matter. Meanwhile, assessment acted as a turning point for many. It was seen to reinforce confidence for some but caused anxiety for others, as students equated success with test performance, especially in post-primary school. Learning continuity, or the absence of, influenced whether students experienced learning and challenge as empowering or disorienting, with perceived gaps or repetition seen to have negative impacts. Finally, peer comparisons were seen to reinforce or disrupt identity positions through their increased visibility across the transition.

Of relevance here is the study by Pettersen and Xenofontos (2023), who identified popularity, effort and achievement as key themes in students' pre-transition mathematical identity formation. These themes resonate with the findings of this study, particularly in how peer positioning (popularity), perceptions of effort (struggling to keep up or feeling disengaged) and assessment-driven self-concept (achievement pressures) shaped students' experiences. However, while their study captured identity influences before the transition, the present study extends this by capturing how these pressures unfold in real time, showing the fluid and negotiated nature of mathematical identity as students navigate the transition from primary to post-primary mathematics.

## **7.6 Conclusion**

This chapter has explored the complexities of students' mathematical identity journeys across the transition from primary to post-primary school. The findings emphasise that transition is not a single moment of change but a dynamic and evolving process, marked by overlapping

mini-transitions and emotional intensity. For many students, the early stages of post-primary school involved moments of disorientation. Their familiar ways of engaging with mathematics were challenged by new classroom norms, assessment structures, learning experiences and peer dynamics. While some students adapted with relative ease, many encountered periods of instability that prompted significant identity negotiation.

A key insight from the study lies in the relational and discursive nature of identity construction. Through the Listening Guide and thematic analysis, findings illuminated how mathematical identity is actively made and remade in response to experiences. Students' narratives revealed how they navigated changing pedagogical practices, tried to work through learning discontinuity, internalised performance pressures and recalibrated their views of self through comparison. This identity work was often quiet and emotionally layered. Importantly, the chapter has demonstrated that identity trajectories are not linear. Many students revisited earlier moments of doubt or disengagement even as they moved towards stability, suggesting that transition extends beyond the boundary of First Year. This has implications for how schools and educators frame the transition and accompanying supports. The need for responsive structures that attend to students' learning progress and also how they see themselves in relation to mathematics seem pertinent. The final chapter will draw together these insights and consider the broader implications of the study, both for research and for practice.

# Chapter 8: Conclusion

## 8.1 Introduction

This study explored the transition from primary to post-primary school, focusing on students' mathematical identities and their experiences of learning mathematics during this important time. Situated within a sociocultural theoretical framework, the study positioned learning and identity as inherently relational and socially constructed processes. Through this lens, the research aimed to illuminate how students' relationships with mathematics evolved as they navigated the transition, addressing key questions around the nature of the transition, identity negotiation and influencing factors during this period.

Adopting a qualitative longitudinal design, the study followed 17 students from the latter half of Sixth Class through to the beginning of their Second Year of post-primary school. Employing semi-structured interviews and PJGs as data collection tools, the findings were analysed using the Listening Guide method and thematic analysis. The research sought to foreground students' voices, capturing the rich, nuanced narratives of their mathematical identity journeys. This chapter brings to light the major findings, highlights key theoretical and methodological contributions, considers the implications for educational practice and policy, and outlines recommendations for future research. It also offers reflective insights into my role as a researcher, before presenting a final conclusion.

## 8.2 Answering the research questions

The previous chapter presented a critical discussion of the research findings, structured primarily around the three research questions. Overall, the findings offered a rich, nuanced understanding of the mathematical identity journeys across the primary to post-primary transition.

Firstly, the findings demonstrated that the transition is a highly complex and multifaceted process rather than a singular event. Students experienced this period through a series of interconnected “mini-transitions” involving academic, social, structural and emotional changes. These mini-transitions frequently overlapped, requiring students to adjust simultaneously to multiple new changes. These included; increased assessment pressures, changes in classroom routines and variations in pedagogical approaches and expectations. By situating the transition within Nicholson’s transition framework (1987), the phase Stabilisation was seen to vary significantly for different students. While some found relative stability by the

end of First Year, others carried unresolved issues into Second Year, reflecting the ongoing and recursive nature of the transition experience.

It was noted that students demonstrated a generally silent acceptance of learning and pedagogical changes encountered during the transition. Many students quietly adapted to a less interactive, more teacher-directed classroom, even when these conflicted with their previous preferences and learning experiences. This acceptance highlighted broader issues regarding student agency and power dynamics within the mathematics classroom. In responding to changes and challenges, identity negotiation emerged and was shaped by the interplay of multiple, often competing voices. Through the Listening Guide analysis, contrapuntal voices linked with confidence, doubt, academic and relational influence illustrated how identity shifts were deeply embedded in students' emotional and relational classroom experiences.

Finally, teachers and the classroom environment were critical influences on students' mathematical identities. Effective teaching practices, characterised by clear explanations, supportive feedback and interactive engagement, positively impacted students' confidence, understanding and sense of belonging. Conversely, inflexible pedagogical approaches, excessive focus on assessment outcomes and reduced collaborative opportunities negatively influenced students' experiences, contributing to feelings of uncertainty. The findings highlighted the intricacies of the transition process. They provide valuable insights into the transitional experiences of students and place importance on supportive and responsive educational environments in fostering positive mathematical identity. Such insights have informed the implications of the study, presented later in this chapter.

## 8.3 Contribution of the study

### *8.3.1 Contribution to knowledge*

This study makes a significant contribution to understanding the transition from primary to post-primary school. In focusing on students' mathematical identity and by placing their voices at the centre of the study, it sheds unique insights in the journeys they made. While much of the existing research has predominantly focused on tracking mathematical performance or gathering insights from teachers, this study explores the lived experiences of students, offering a nuanced perspective on their mathematical identity across the transition. Using a qualitative longitudinal approach provided rich, real-time insights into their identity journeys, capturing periods of struggle, confidence, doubt and recovery.

An important finding of this study is the framing of transition as a complex and extended process of adaptation. By following students into Second Year, it became clear that adjustment to post-primary school often continued beyond First Year. The concept of “mini-transitions” proved useful in capturing the multiple academic, social and emotional adjustments students encountered throughout this period. Students navigated a series of turning points that required repeated adaptation. While Nicholson’s (1987) Transition Cycle offered a helpful starting point, its application to younger learners and subject-specific transitions may be limited. In this study, students’ experiences did not consistently align with the expected sequence of the framework’s stages. Instead, adaptation was recursive and layered, with students revisiting moments of uncertainty or instability even after periods of apparent progress. This resonates with Symonds and Hargreaves (2016), who found support for the initial three stages of Nicholson’s model in school transition contexts, but no clear “evidence of psychological stabilization”. Similarly, this study found that full stabilisation did not occur for all students, particularly those who continued to face ongoing challenges. These patterns highlight the complexity of the transition, suggesting that stabilisation may be partial or provisional, and dependant on the level of disruption experienced.

The use of mathematical identity as a lens to explore students’ relationships with mathematics across the transition offered insights into its dynamic and socially constructed nature. It highlighted how students’ relationships with mathematics are in particular flux at this time, with emotions, expectations, new experiences and social surroundings all contributing to this sense of change. Particular influences were seen to centre around the teacher and their pedagogical practices, peer relationships, assessment and learning continuity. By capturing the voice of students across the transition, this study adds to the growing research base in the area of mathematical identity. It deepens understanding of how mathematical identity is experienced and negotiated by students during the transition. In doing so, it contributes to evolving conceptualisations of mathematical identity within research, foregrounding its fluid, relational and socially mediated nature. Through a sociocultural lens, the study highlights how students make sense of themselves as mathematics learners through language, affect and relationship. It positions the transition from primary to post-primary school as a critical site of intensified negotiation, conflict, adjustment and reconfiguration for students’ mathematical identity.

A notable contribution of the study also lies in bringing to light the emotional and affective dimensions of mathematical identity development. Emotions such as frustration, uncertainty, anxiety, pride and hope were all integral to how students positioned themselves in relation to mathematics. The affective responses of the students were central to the negotiation

of their mathematical identity. Moreover, the concept of “silent acceptance” emerged as a significant and somewhat novel finding. Students frequently adjusted to shifts in pedagogy, assessment and classroom norms without any overt expression of resistance. In many cases, these changes conflicted with their earlier preferences or ways of learning, yet students did not question them or suggest alternatives. Instead, they appeared to absorb the changes as inevitable or simply “the way things are”. This raises important questions about how students perceive their own agency in navigating classroom practices, and about the wider structures of power and voice within mathematics education.

### *8.3.2 Methodological contributions*

A key methodological contribution of this study lies in its narrative-enactivist design and its commitment to capturing identity as a lived, dynamic and relational experience. This offered a more situated and process-oriented account of transition, with the students actively engaged with the data-collection tools selected. It also put an emphasis on the context in which they were situated, with the longitudinal structure of the study ensuring that account was taken of their time in primary and post-primary school. The overall longitudinal design of the study was also central to tracing the students’ identity journeys. The structure enabled the study to move beyond snapshots of ‘the before and after’, and attempt to get in closer to reach the lived experiences of the students. A key aim here was to gather insight into both what changed and also how and why those changes occurred.

In particular, the use of the Listening Guide allowed access to often-silenced or marginalised dimensions of identity. This captured the internal dialogues and emotional tensions they experienced as they navigated the transition. The layered analysis of contrapuntal voices provided a textured view of students’ mathematical identity negotiation over the time of the study. This voice-centred approach revealed how narratives often held competing or contradictory positions, illustrating the complexity of negotiation during the transition. Additionally, within this framework, the use of I poems proved particularly valuable. For me, as researcher, foregrounding the students’ own language was powerful and helped the study remain true to its central aim. The poems revealed how the students positioned themselves in relation to mathematics and isolated key statements that provided insight into internal shifts. They exposed emotional undercurrents and identity negotiation that may have been missed somewhat in more conventional forms of analysis.

This study also makes a methodological contribution by demonstrating the value of qualitative, student-focused approaches in exploring mathematical identity. Using semi-

structured interviews placed students' voices and narratives at the centre of the research. The richness of these narratives helped forge a very insightful picture of each student. Further, in building on insights from the pilot study, the addition of PJGs provided a visual representation of the students' identity journeys over time. The integration of both the tools was seen to be particularly helpful for the students. Indeed, during the interviews, the students became quickly used to and comfortable with the PJGs, sometimes indicating their enjoyment in completing them. Importantly, the PJGs took account of the relatively young age of participants and served as a reflective scaffold for them, which helped promote deeper engagement and reflection of their experiences. For example, key movements on their PJGs often led to deeper narrative exploration and provided me with a launch pad for a further question or point of exploration. The tools themselves allowed mathematical identity to be seen as a fluid, negotiated experience that unfolded over time. It highlights the potential of integrating participatory, visual and narrative methods in educational identity research, especially when working with younger participants. It also contributes to the emerging methodological repertoire for capturing the complexity of mathematical identity.

## 8.4 Implications of the study

This study offers important insights into the development of students' mathematical identities as they transition from primary to post-primary school. The findings highlight how sociocultural, institutional and pedagogical factors interact with students' mathematical identity. The insights gained carry implications for educational practice, policy and future research, particularly in understanding how mathematical identity is continuously negotiated. The implications presented below are organised into three areas: learning, teaching and assessment; student support; and curriculum and policy. While each domain is addressed separately, they are deeply intertwined in shaping students' lived experiences of mathematics across the transition.

### *8.4.1 Implications for learning, teaching and assessment*

A key implication concerns the role of teachers and assessment in influencing students' mathematical identities. Teachers play a pivotal role in how students perceive themselves as learners, with pedagogical practices seen to have a noted impact in the eyes of students. Equally, assessment was emotionally impactful, especially in post-primary school with its perceived importance surpassing understanding in the eyes of students.

- Students described pedagogical practices, mainly in primary school, that prioritised collaboration, discussion and active learning. The students valued time to work with

their peers and share challenges. These were seen as central to their enjoyment of mathematics learning, contributing to positive identity formation. To sustain these positive experiences, post-primary classrooms should preserve opportunities for active participation and the use of varied solution strategies.

- The findings of the study emphasised the importance of clear, accessible teaching approaches. Students responded positively to learning in post-primary school that built logically from their primary school experiences. When teaching moved too quickly or skipped over foundational ideas, students described feeling confused and uncertain. This suggests a need for teaching that checks for student readiness, a process that should acknowledge and bridge prior knowledge, before introducing new concepts.
- Several students appeared outwardly settled in their post-primary classrooms but privately described uncertainty or loss of interest, something referred to earlier as silent acceptance. Teachers should not equate compliance with comfort. Instead, they should create regular opportunities to elicit feedback on how students feel about mathematics learning, paying particular attention to those who may not openly voice their concerns.
- Students expressed a wide range of emotional responses to learning mathematics during the transition, from curiosity and excitement to anxiety and self-doubt. These emotions influenced how they saw themselves as mathematics learners. Teachers and school leaders must account for the emotional impact of transition, fostering classroom environments where students feel safe to express doubt, ask questions and take risks without fear of failure.
- The findings highlighted how assessment became more frequent and more pressurised in post-primary school. Many students described feeling that test performance defined their mathematical ability, shifting focus from understanding to performance and memorisation. A shift towards more formative, low-stakes assessment practices, that include opportunities for self-reflection and feedback, would better support students in seeing assessment as part of learning, not just judgement.
- Students also reflected on the high stakes nature of early post-primary assessments, especially where results influenced class placement decisions. Some described internalising these outcomes as fixed labels, which fostered narrow definitions of mathematical success. A more holistic approach to such placements would better support identity development across this critical period.

#### *8.4.2 Implications for student support*

The findings of this study also bring to light areas in which students need particular support in making the transition from primary to post-primary.

- Students encountered a steep adjustment to new expectations and routines in post-primary mathematics, including note-taking and study habits. These practices were unfamiliar and, for some, overwhelming. Support structures, such as scaffolded guidance and peer-mentoring, could help students build these skills gradually and confidently.
- Specific areas within mathematics arose as being problematic for students in terms of continuity. Algebra was the most significant challenge for many. While more substantial structural coherence seems required here, interim targeted and scaffolded supports of algebraic concepts could help to ease this specific issue and prevent early disengagement.
- Students experience the transition as a series of overlapping academic, emotional and structural adjustments. Supports that reflect this complexity, such as phased subject introductions, check-ins focused on emotional wellbeing or spaces for students to reflect with their peers on their evolving experience, would better align with how students actually experience the transition.
- Many existing in-school support initiatives focus on the initial months of post-primary schooling. However, this study highlights that students' mathematical identity remain in flux towards the end of First Year and into Second Year. Schools should consider extending the option of transition support structures beyond the initial months of First Year.
- Additionally, students expressed that while the transition was sometimes discussed in Sixth Class, more concrete, sustained preparation would have eased their uncertainty about what to expect. Greater transparency and structured guidance, particularly around classroom routines, could help students feel more prepared and confident ahead of their move to post-primary school.

#### *8.4.3 Implications for policy*

Beyond the classroom, the study points to broader structural considerations in the area of policy and curriculum that would better support students at this time. The findings indicate continuity in learning and teaching matter for students.

- Students described confusion and self-doubt when introduced to certain mathematical concepts in post-primary school. Topics such as Algebra and Sets, which they had little perceived experience of in primary school, were highlighted by students as particularly challenging. A review of how Algebra sits across the curriculum in upper primary and in early post-primary may help pinpoint the challenges and provide opportunity to develop greater continuity.
- Strengthening curriculum supports between both sectors more generally is required. Current curriculum bridging supports are outdated and no longer match the curriculum in both sectors. They should be reviewed to reflect recent curriculum change and the real experiences of learners.
- Many students reported experiencing sudden pedagogical shifts, such as a move from hands-on, collaborative primary classrooms to more individualised, note-focused post-primary learning. These changes had a clear impact on students' mathematical identity. To support smoother transitions, policy should actively promote more collaboration between sectors. Greater dialogue on learning, teaching and assessment matters between both sectors would help improve the experience for students. To make this happen, schools would need to be supported to release teachers.
- The study highlights the value of student voice in providing a picture as to the lived experiences of the transition. The narratives revealed the emotional and relational dimensions of the process, often absent from policy discourse. Providing systematic opportunities for students to share their experiences, more generally, would help strengthen policy level decisions and ensure changes are having a positive impact on students.
- Finally, students' reflections in this study highlight the importance of looking beyond narrow metrics of performance in mathematics education. It suggests that policy should take account of the identity based dimension of mathematics learning. Recent focus at that level has generally focused on attainment and international assessment data. A more holistic view of mathematics learning is required to ensure that students are provided with a more meaningful and connected learning experience.

Collectively, these implications highlight the importance of relational and responsive approaches to mathematics education across this critical period. Schools and policymakers must shift their focus from short-term transition interventions to recognising transition as a prolonged period of adjustment and negotiation, requiring sustained support. A more holistic, inclusive

view of mathematics education that values understanding, voice and identity is key in enabling all students to see themselves as capable and valued mathematics learners.

## 8.5 Future research

In addition to contributing to the research base, this study produced knowledge that might act as a lever to inform further research in this area. As highlighted in the opening chapters, mathematical identity is still considered a relatively new research concept. Given its deep relational nature and usefulness in capturing the lived experiences of students, scope to further explore it within the Irish context appears ripe. Building on this study and recent longitudinal studies, such as the GUI study and the Children's School Lives study, exploring a fuller trajectory of learners' mathematical identity could be undertaken. While this study captured identity journeys over a defined transition period, future research should consider extended longitudinal studies to trace students' mathematical identity trajectories before and after this time.

With assessment raised as a critical theme in this study, future research should aim to further unpack the nuanced ways in which it can impact students' mathematical identity. As well as a deeper dive into the change in assessment focus in primary and post-primary sectors, research could investigate different assessment models that could include methods such as portfolios and project-based learning, examining their effects on students' mathematical identity. Linked to this, future research could investigate the longer-term impact of ability grouping on students' mathematical identity, particularly beyond the initial placement that typically takes place at the beginning of Second Year in the Irish context. While students in this study expressed little resistance to the process of streaming, the narratives revealed subtle shifts in confidence and positioning as they approached streamed classes. Further research could explore how these placements shape identity journeys as the realities of streamed environments begin to set in.

The study's findings suggest that curriculum and learning discontinuities between primary and post-primary mathematics can disrupt students' learning experiences and their mathematics identity. This was especially apparent in the area of Algebra. Investigating the trajectory of algebraic learning and mapping this onto the current mathematics curriculum at primary and post-primary could support greater curriculum alignment. Future research could also examine what curriculum supports might be developed to help bridge these gaps and promote cross-sector collaboration. Alongside this, a key tension arises from the perceived gap between the active, student-centred approaches promoted in post-primary mathematics

teacher education and the more didactic, textbook-driven methods evidenced in this study. Future research might explore the systemic factors contributing to this disconnect, including the influence of textbook reliance and the backwash effect of high-stakes state examinations in Third Year and Sixth Year. Understanding how these constraints shape pedagogy could inform the development of more supportive structures that enable post-primary teachers to adopt more dialogic and responsive pedagogies.

While this study foregrounded student voice, it did not set out to examine the experiences of particular subgroups. Future research could also take a more targeted focus in examining mathematical identity of students using different social and demographic lenses, including SEN, socio-economic background and gender. Previous research, as cited in Chapter 2, has shown that students with SEN may face heightened challenges during the transition process, including difficulties with social integration and access to support (Foley et al., 2016). Likewise, students from migrant or lower socio-economic backgrounds may encounter additional barriers that influence their positioning as mathematics learners. Gender dynamics in mathematics education also remain a significant area of concern. Future research adopting an intersectional lens could explore how these factors interact with classroom practices, peer dynamics, learning continuity and assessment structures to shape identity trajectories across the transition.

Finally, further research examining students' mathematical identities across the transition might incorporate the perspectives of teachers and peers to further explore the relational dimensions of identity. Additionally, given the pivotal role teachers were seen to play in this study, there is scope to explore teachers' own perceptions of their influence on students' mathematical identity.

## 8.6 Limitations

While this study provides valuable insights into students' experiences across the primary to post-primary transition, a number of limitations are acknowledged.

1. The study followed 17 students across a 20-month period, providing rich, qualitative data on their mathematical identity journeys. The findings provide new insights into these journeys across the transition, but cannot claim to have validated this across the entire student cohort.
2. Linked with the small sample size was a decision not to explore school type in the study. While the students originated from a number of different primary schools and moved to a number of different post-primary schools, it was not within the parameters of the study to seek patterns based on this information. Additionally, the study did not explore

factors such as gender, ethnicity, socio-economic status, family background or special educational needs, despite acknowledging that these can have an impact on one's mathematical identity and on their experience of the transition process.

3. While the longitudinal design provided valuable insights, the study involved five interviews spaced several months apart. It is possible that fluctuations in their identity and their feelings about mathematics occurred between these points. Although reflective questions such as "How have things been since the last time we spoke?" helped mitigate this, the analysis may not fully capture short-term shifts that arose and resolved between interviews.
4. Data collection was conducted in the immediate aftermath of the COVID-19 pandemic which featured much upheaval and challenge in terms of children's learning. This had influence on the data collection in terms of the use of the Zoom platform, as previously discussed. It was noted that across the students' narratives, reference to their experiences during the pandemic did feature.
5. The study relied on semi-structured interviews to explore students' perspectives. While these methods foreground the student voice, they also introduce subjectivity. Students' reflections are influenced by memory, interpretation and their own framing of past experiences. Given the age of the students involved, this act of recollection may shape how events are understood and shared.

## 8.7 Final reflection

My prior experience as a primary school teacher of Sixth Class students and my current role in curriculum development motivated me to research this area. Working in curriculum development brought curriculum change to the fore in my working life and it was hard not to notice and wonder about the significant curriculum change in mathematics education that has taken place in Ireland over the last decade. In that light, I feel my research is timely, especially following on from the relatively recent publication of the Primary Mathematics Curriculum (DE, 2023a). Reflecting critically throughout the research process, including through the use of reflective journaling, helped me recognise my positionality as an insider and increased my awareness of personal biases. Additionally, by deliberately focusing on the voice of students, I wanted to cast a spotlight on their views of the transition. During the engagements with the students, the importance of openness and genuine dialogue arose in my thinking and it brought home the value of authenticity when capturing the experiences of students.

My research journey was not without its challenges. Working with the concept of mathematical identity was sometimes daunting, especially in trying to build a theoretical and conceptual base that heeded the many warnings as shared within the literature. Additionally, balancing sustained engagement with the students over a long period required careful logistical planning and relationship-building. Challenges posed by the COVID-19 pandemic were overcome through online tools, with the students very proficient in their use.

Overall, I feel that this research highlights the necessity of cultivating supportive environments that foster a resilient mathematical identity, not just during transitions but throughout students' broader educational journeys. This, for me, is the critical message. Undertaking this research journey has deepened my understanding of the complexities of transition and, indeed, mathematical identity. Recognising this complexity can help us all create more inclusive, supportive and identity-affirming mathematics learning environments and experiences for students.

## 8.8 Final conclusion

In the opening chapter, the transition from primary to post-primary was metaphorically depicted as a humpback bridge, obscuring students' vision of what lay ahead (Steed & Sudworth, 1985). This study extends that analogy, illustrating that even when students reach the bridge's crest, complexity still lies ahead for many. Rather than discovering a clear path forward, many students face winding roads and detours ahead posing risks to their relationship with mathematics. Students are asked to carefully track this journey and find their way through the unknown. At the heart of this research lies a powerful insight; the transition from primary to post-primary is not simply an educational move, it's an intricate story of identity negotiation.

Crucially, this research highlights key practical implications, including pedagogical and learning continuity, assessment practices and the need for supportive learning environments. It highlights the necessity for sustained and responsive transition support. A significant contribution of the study is the amplification of the voice of students. Their narratives powerfully illustrate that transition in mathematics education is far more than an academic or structural change, it is fundamentally a personal and unique journey for each student. This study amplifies the importance of genuinely listening to students' voices. It offers a compelling case for nurturing mathematical identities, valuing individual narratives and supporting students in their educational journeys.

Ensuring students feel capable and valued in mathematics is not merely a transition-based concern, it is a fundamental educational priority that must be woven consistently throughout their entire learning journey.

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# Appendices

## Appendix A

### Summary of pilot study

#### Overview

Ethical approval was granted for a pilot study on May 31<sup>st</sup>, 2021 (reference: DCUREC/2021/108). The study took place between June and October 2021. Two data collection methods were utilised, semi-structured interviews and student drawings. The interviews took place on the Zoom platform, with the Otter application used to transcribe the audio.

With the main study due to be longitudinal in nature, spanning a two-year period, it was acknowledged that it will require significant commitment on the part of the participants and indeed the researcher. Furthermore, due to COVID-19, physical access to schools and participants was very difficult with alternative arrangements required. In this light, it was deemed necessary to examine the feasibility of the research methods, recruitment and retention of participants and the suitability of an online platform to mediate data collection in this area of study. The benefits of this pilot study were thus to inform and provide a suitably rigorous methodological approach for the main study.

#### Participants

Three students participated in the pilot study, two boys and one girl. These students were recruited from a school known to the researcher. All three students were in sixth class at the time of joining the study, and took part in two interviews, while also submitting drawings. Initial recruitment of participants did prove difficult, with a follow-up visit required by the researcher. I felt the time of year (June) did not help in this regard.

#### Insights gained

A number of themes emerged from the preliminary analysis of the data. Evidence of students resetting their relationships with mathematics emerged from the interview and drawing data. For one student in particular, they moved from a disengaged space in primary school to a more positive viewpoint, where they forged a new appreciation of the importance of mathematics. The drawings from this student (see Figures A1 and A2) portray this change to a certain extent also. Commenting on the drawings, the student shared, "I'm enjoying maths more is what it shows." Despite sharing very diverse experiences of mathematical learning, in their first

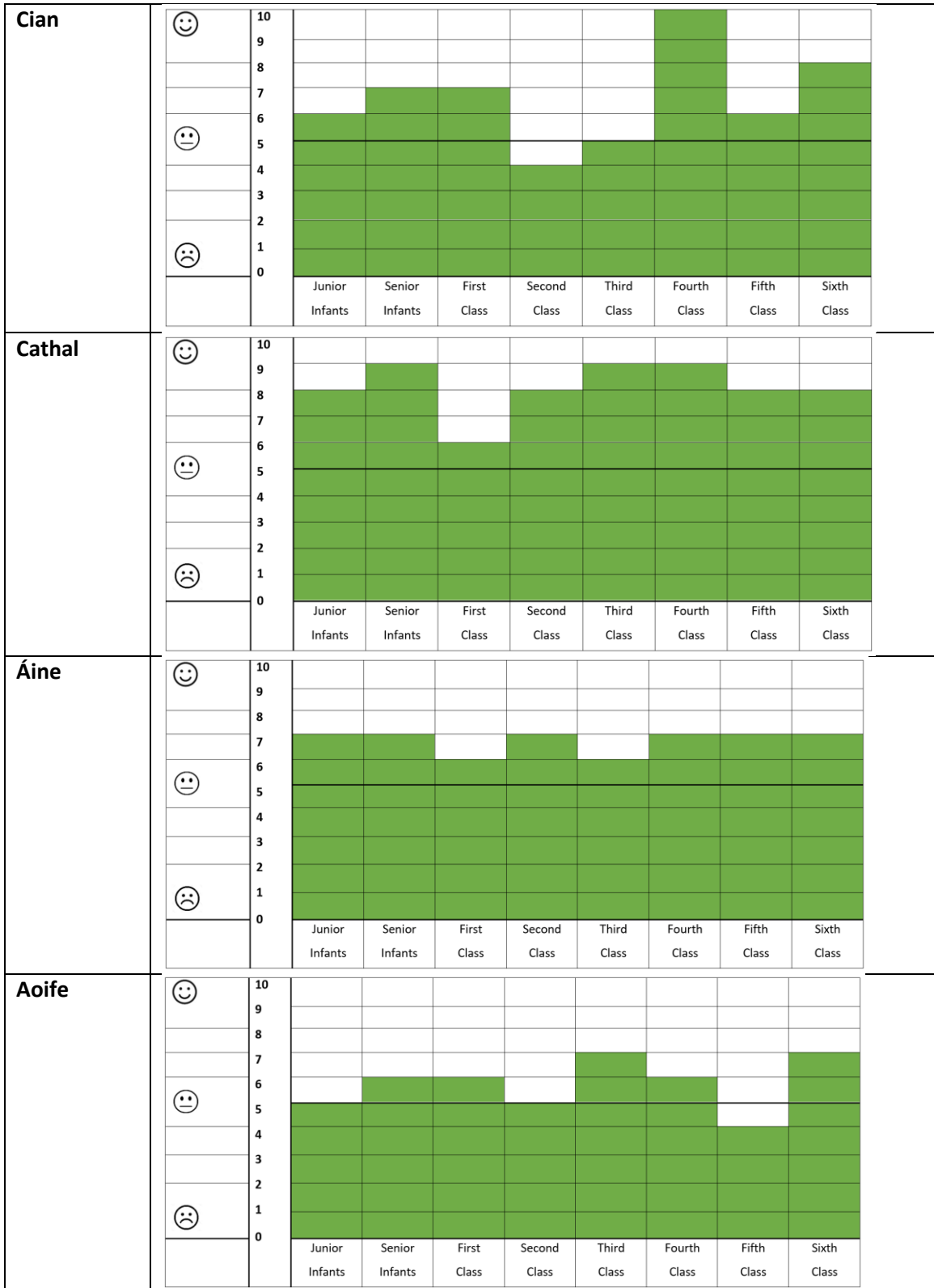


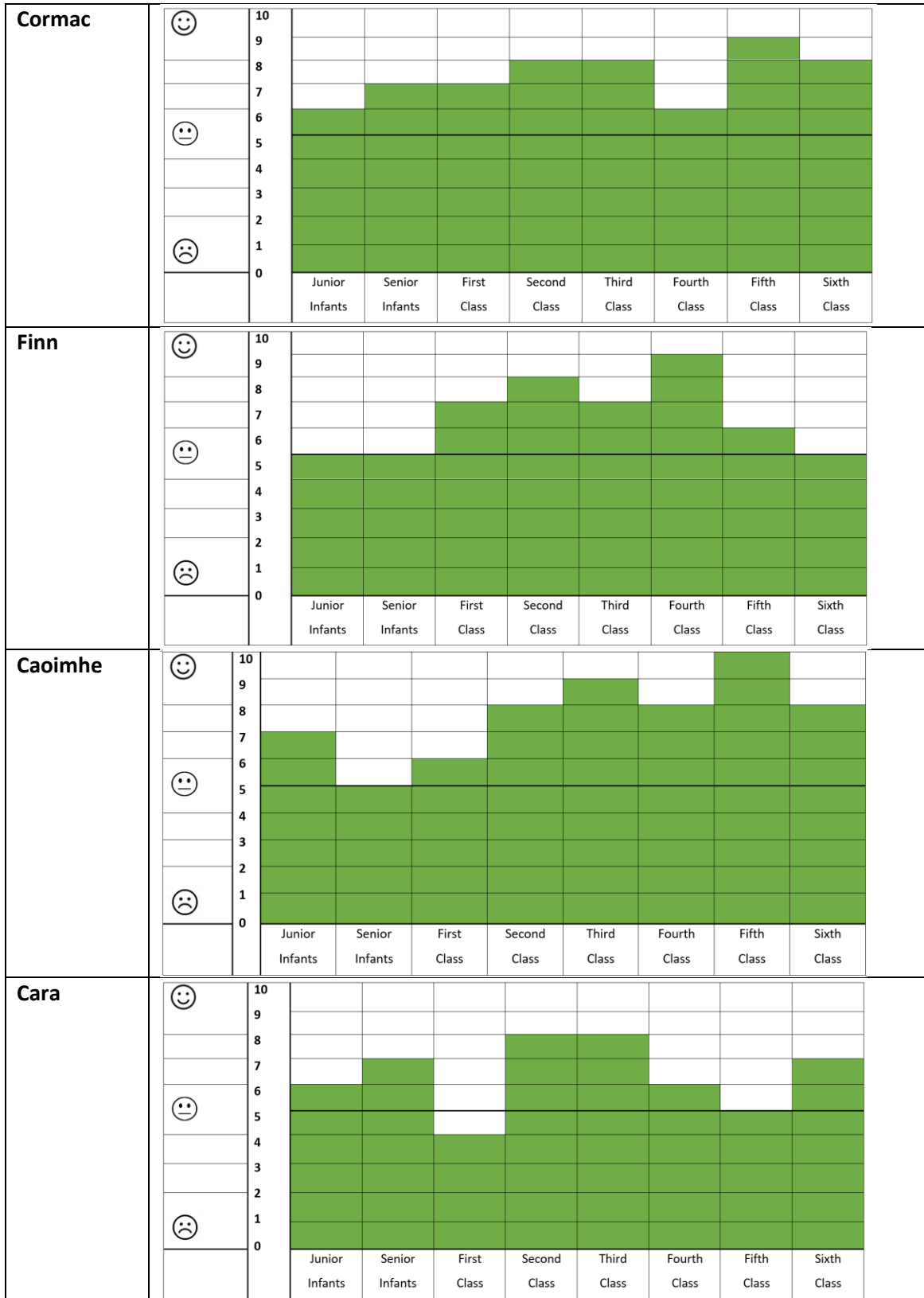
2. The semi-structured interviews were conducted via Zoom. All participants were able to complete their interviews easily, with no technical issues emerging. Following the completion of the interviews, I felt that for the main study, the first interview should put more focus on establishing a life history of the participant in relation to mathematics. Further time exploring any significant events in the participants past would also be useful. In this light, it is felt that the use of PJGs could help structure and visualise the participants past relationship with mathematics.

3. While the student drawings from one student offered some interesting insights into their views of mathematics, overall the drawings were scant and not very insightful. One factor may have been that the students had to complete these drawings in advance of the interview, with scarcity of time a possible factor leading to rushed outputs. For the main study, it will be important to have a very clear focus or theme for these drawings if proceeding with them, and also careful consideration as to how to try ensure they are more meaningful for the study. The theme or task will need to allow students reflect their journey across the transition.

# Appendix B

Personal journey graphs relating to students' primary school years





<b>Clodagh</b>	😊	10								
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		8								
		7								
		6								
	😊	5								
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	☹️	1								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Enya</b>	😊	10								
		9								
		8								
		7								
		6								
	😊	5								
		4								
		3								
		2								
	☹️	1								
	0									
			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Gráinne</b>	😊	10								
		9								
		8								
		7								
		6								
	😊	5								
		4								
		3								
		2								
	☹️	1								
	0									
			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Patrick</b>	😊	10								
		9								
		8								
		7								
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	😊	5								
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	☹️	1								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class

<b>Oisín</b>	😊	10								
		9								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Maeve</b>	😊	10								
		9								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Niamh</b>	😊	10								
		9								
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	☹️	1								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class
<b>Saoirse</b>	😊	10								
		9								
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			Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth Class	Sixth Class



## Appendix C

### Letters and forms related to ethical approval

#### *Letter to principal and Board of Management*

Dear Principal and Chairperson of the Board of Management,

My name is John Behan and I am a student in Dublin City University completing a PhD study in the school of STEM Education, Innovation and Global Studies.

My study is focused on students' mathematical learning as they move from primary to secondary school. Each year in the Irish context, 65,000 to 70,000 students make this transition and education research has shown it to be a significant time for students' mathematical learning. The study will focus particularly on students' mathematical identity, exploring how they view themselves as learners of mathematics. It will involve an in-depth examination of such identity across the transition - what it looks like, what factors influence it and in what ways it shifts over the course of this time. The aims of the study are as follows:

1. Explore mathematical identity across the transition.
2. Increase knowledge and understanding on the impact the transition from primary to post-primary has on students' relationship with mathematics.
3. Provide a voice for students making the transition from primary to post-primary in the Irish context.

I would be delighted if students in 6<sup>th</sup> class were invited to participate. Involvement in this research study is voluntary and participants are free to withdraw from the study at any time without giving any reason. Please be assured that the school and children involved will not be identified and no real names will be used in reporting the research. Data collected through student interviews and drawings will be kept confidential, subject to legal limitations, and all notes and recordings taken will be kept securely under lock and key or password protected and destroyed or deleted within one year of the completion of my PhD.

If you have any questions about this study, please contact me through the details provided below. After the research is finished, if desired, I can provide you with a summary of the findings.

Thank you for your interest and support.

Yours sincerely,

\_\_\_\_\_

John Behan ([John.behan7@mail.dcu.ie](mailto:John.behan7@mail.dcu.ie))

Please sign below to give your consent for students in your school to be invited to take part in this research:

\_\_\_\_\_ (Principal)

\_\_\_\_\_ (Chairperson of the Board of Management)

### *Plain language statement for parents*

Dear Parent/Guardian,

My name is John Behan and I am a student in Dublin City University completing a PhD study in the school of STEM Education, Innovation and Global Studies.

My study is focused on students' mathematical learning as they move from primary to secondary school. Each year in the Irish context, 65,000 to 70,000 students make this transition and education research has shown it to be a significant time for students' mathematical learning. The study will focus particularly on students' mathematical identity, exploring how they view themselves as learners of mathematics. It will involve an in-depth examination of such identity across the transition - what it looks like, what factors influence it and in what ways it shifts over the course of this time.

I am seeking to work with a number of sixth class children as they make their move to post-primary school. The aims of the study are as follows:

1. Explore mathematical identity across the transition.
2. Increase knowledge and understanding on the impact the transition from primary to post-primary has on students' relationship with mathematics.
3. Provide a voice for students making the transition from primary to post-primary in the Irish context.

Your child's participation in this research involves taking part in five short interviews with me, as well as completing personal journey graphs and student drawings relating to their maths learning. The study will run from March this year until November 2023 when your child is in second year in secondary school and will take place over Zoom. The interviews will be conducted in line with DCU's Zoom and Data Protection Guidance (<https://www.dcu.ie/sites/default/files/inline-files/zoom-data-protection-guidance-for-dcu-staff-v2.pdf>) and Zoom protocols for the study have been developed and will be sent to all those who agree to take part. During the interviews, I will be asking your child questions about their maths learning – their relationship with the subject and gathering their expectations of secondary school. The audio of the interview will be recorded, but no video.

Involvement in this research study is voluntary and participants are free to withdraw from the study at any time without giving any reason. If you do not consent to your child's participation this will not affect them in any way. If your child does participate, the study may help them develop a richer and deeper sense of who they are as mathematical learners and track their relationship with the subject across the move from primary to secondary school.

Please be assured that the school and children involved will not be identified and no real names will be used in reporting the research. Data collected through student interviews, drawings and graphs will be kept confidential, subject to legal limitations, and stored in my DCU Google Drive account which is password protected and approved for data storage by DCU's Data Protection Officer. Printed forms that





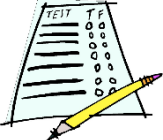





are returned will be placed in a locked filing cabinet. All notes and recordings taken will be kept securely under lock and key or password protected and destroyed or deleted within one year of the completion of my PhD study.

If you have any questions about this study, please contact me on [john.behan7@mail.dcu.ie](mailto:john.behan7@mail.dcu.ie). If you are happy for your child to participate, please complete the consent form and return it to me.

If you have concerns about this study and wish to contact an independent person, please contact: The Secretary, Faculty Ethics Review Panel Institute of Education, DCU St Patrick's Campus, Dublin City University, Drumcondra, Dublin 9. E-mail: [ferp@dcu.ie](mailto:ferp@dcu.ie).

Thank you for your interest and support.

*Plain language statement for participants*

	<p>Maths is important for all students in primary school. When students in 6<sup>th</sup> class move to secondary school, they will continue to learn maths.</p>
	<p>I am looking for students to take part in research study that focuses on children’s feelings towards maths as they move from primary to secondary school. I want to find out if and how your feelings towards maths change at this time.</p>
	<p>Participating part in the study involves taking part in five interviews with me on Zoom. You will also be asked to draw some simple drawings and complete a graph about your maths learning.</p>
	<p>The first interview will take place in April. The final interview will take place at the beginning of second year in secondary school.</p> <p>The interviews will last approximately 20 minutes each time and will take place on Zoom. The drawings should take no longer than 15 minutes and can be photographed and sent to me via e-mail.</p>
	<p>During the interview, you will be asked a number of questions linked to what you think about maths. If you’d prefer, your parent or guardian can join you on the interview.</p>
	<p>If you do not feel comfortable taking part in the study, we will stop immediately. You won’t have to take part in this study after that.</p>
	<p>Any information I collect in this study will never use your name or the name of the school.</p>
	<p>I will keep all of the information in a secure, pass-worded file on a computer, which no one else can access. Any forms returned will be kept safely in a locked filing cabinet.</p>
	<p>I will keep the information until my PhD study is finished. After this I will safely delete the information within five year.</p>
	<p>If you and/or your parent(s)/guardian(s) have any questions about this project, please contact the researcher: Email: <a href="mailto:john.behan7@mail.dcu.ie">john.behan7@mail.dcu.ie</a></p>

### *Consent form for parents*

*Please fill in this copy and return to the school.*

Research Study Title: An identity in transition? A longitudinal study examining students' mathematical identity across the transition from primary to post-primary school.

Clarification of the purpose of the research: The aims of the study are:

1. Explore mathematical identity across the transition.
2. Increase knowledge and understanding on the impact the transition from primary to post-primary has on students' relationship with mathematics.
3. Provide a voice for students making the transition from primary to post-primary in the Irish context.

*Please complete the following: Circle Yes or No for each question.*

I have read the Plain Language Statement	Yes/No
I understand the information provided	Yes/No
I understand the information provided in relation to data protection	Yes/No
I have had an opportunity to ask questions and discuss this study	Yes/No
Where necessary, I have received satisfactory answers to all my questions	Yes/No

I have read and understood the information in this form. The researcher has answered my questions and concerns, and I have a copy of this consent form. Therefore, I consent for my child, \_\_\_\_\_, to take part in this research project.

Contact e-mail address to which the Zoom link for the interviews can be sent:  
\_\_\_\_\_





Parent/Guardian Signature: \_\_\_\_\_

Name in Block Capitals: \_\_\_\_\_

Date: \_\_\_\_\_

*Assent form for participants*

A research study is a way to find out new information about something. You are being asked to take part in this research study because we are trying to learn more about what children think of maths as they move from primary school to secondary school.

<p>I have had this research explained to me.</p>		<p>I understand that I will be asked to take part in interviews and complete drawings and graphs about my maths learning.</p>
<p>I understand what is expected of me.</p>		<p>The interview will take place on Zoom and I can bring somebody with me if I want.</p>
<p>I can stop taking part in the research at any stage if I want to</p>		<p>I am happy to have the audio from the interview recorded.</p>
<p>I can take a break when I need to.</p>		<p>I would be happy to talk to another person if I have any big concerns.</p>

I agree to take part in this project.

Name: \_\_\_\_\_



Witness: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix D

### Interview schedule used for wave 3 of data collection

#### Personal life story

1. When you think about yourself and maths right now, what comes to mind?
2. How do you feel towards maths at the moment?

#### Post-primary school

3. In thinking back over your maths learning since we last spoke, you've started in secondary school, how is that going for you?
4. Has there been any standout moments in relation to maths since you started in secondary school? Tell me a little bit more about that.
5. Looking back on primary school and learning maths now, how would you compare it to learning maths in secondary school?
6. We will return to the maths journey graph we completed the last day. This time in focusing on the last two months in particular, so the start of first year, using the scale from 0 to 10, how would you rate your overall relationship with maths across this time?

#### Looking ahead

7. Looking ahead, what are most looking forward to about maths?
8. What are you most not looking forward to about maths in the months ahead?

#### Another viewpoint

9. How do you think your new teacher or one of your new classmates in your class would describe you as a maths learner?

#### Conclusion

10. Do you have anything further to add?

# Appendix E

## Ethical approval granted by DCU Research Ethics Committee

Ollscoil Chathair Bhaile Átha Cliath  
Dublin City University



John Behan  
School of STEM Education, Innovation and Global Studies

Dr. Lorraine Harbison  
School of STEM Education, Innovation and Global Studies

14<sup>th</sup> March 2022

**REC Reference:** DCUREC/2022/036

**Proposal Title:** An identity in transition? A longitudinal study examining students' mathematical identity across the transition from primary to post-primary school.

**Applicant(s):** John Behan, Dr. Lorraine Harbison, Assoc. Prof Brien Nolan, and Dr. Therese Dooley

Dear Colleagues,

Thank you for your application to DCU Research Ethics Committee (REC). Further to expedited review, DCU REC are pleased to issue approval for this research proposal. This approval is conditional on the DCU Data Protection Unit (DPU) approving the project and any related documentation, such as a data protection impact assessment (DPIA). Research should not begin until this is in place.

DCU REC's consideration of all ethics applications are dependent upon the information supplied by the researcher. This information is expected to be truthful and accurate. Researchers are responsible for ensuring that their research is carried out in accordance with the information provided in their ethics application.

Materials used to recruit participants should note that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee. Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Dr. Melrona Kirrane'.

**Dr. Melrona Kirrane**  
Chairperson  
DCU Research Ethics Committee



**Taighde & Nuálaíocht Tacaíocht**  
Ollscoil Chathair Bhaile Átha Cliath,  
Baile Átha Cliath, Éire

**Research & Innovation Support**  
Dublin City University,  
Dublin 9, Ireland

T +353 1 700 8000  
F +353 1 700 8002  
E [research@dcu.ie](mailto:research@dcu.ie)  
[www.dcu.ie](http://www.dcu.ie)

# Appendix F

## Sample of transcription

### Sample of transcription of interview 4 with Saoirse

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Student 16

Interview 4

**Interviewer**

Why do you think that is?

**Saoirse**

A lot of people in Sixth Class, like you would have been with them for a couple of years and like they wouldn't have minded and now this year, everyone says oh this person is putting up their hand and we can't move on and things so.

**Interviewer**

Okay and do you think you are more conscious of other people in their class now than you probably would have been in Sixth Class?

**Saoirse**

Yeah, yeah.

**Interviewer**

Okay, and as you said, you have people not wanting to be seen to hold up the class. Is there anything else that causes that?

**Saoirse**

Well yeah, like you don't want to be coming across like you don't know everything in class, because there could be a few that know a lot, and they'll always be getting very high scores in their maths, and then there'll be people that are, just, they struggle with maths. They'd be saying, "Oh, I got ninety something in my test", and you might have gotten maybe in the seventies and the sixties.

**Saoirse**

Okay, and would that be the same for every subject, or do you think it is more specific to maths?

**Saoirse**

Ah it's mainly in maths. People struggle more in maths class.

**Interviewer**

Okay, so mainly in maths?

**Saoirse**

Yeah.

**Interviewer**

I understand, and do you get on well with your classmates in maths class?

**Saoirse**

Well, like, I get on great with them and like everyone in my class, but it's just, you know, you don't want to be holding up the class and keep don't understanding the one question, and the teacher is kind of getting frustrated with you that you don't know much.

**Interviewer**

Okay, moving on to the next question. Up until now, when you think back over maths in secondary school, what do you think has been the biggest positive for you?

**Saoirse**

Am, I'm not sure really. I don't feel positive about maths now, so I think I'm finding it hard to think of something. Maths is just getting harder.

# Appendix G

## Sample of researcher comments

Sample piece of transcribed script from interview 2 with Caoimhe, with comments added as part of step 1 of the Listening Guide.

Interview 2

Student 7

**Caoimhe**  
Um (#2), well, like I had like a maths test today for like half of it for the November test, and then to have study like a bit for it. It's like not really overwhelming but I thought there was a bit of information that you have to know.

**Interviewer**  
Okay, do you want to tell me a little bit about the study involved for that test?

**Caoimhe**  
Well, they sent all revision lists out for the maths but it was like loads of different pages of them. So I tried to do like different like, they gave like sample questions and I tried to do that. But then like, if I weren't to know a question, I'd have to look it up in the book. So it kind of took a while to do all them.

**Interviewer**  
Okay. In terms of maths, has there been any other stand up moments since you started in secondary school?

**Caoimhe**  
Well, like we still do it now, but like at the start we did loads of like writing down in every maths class. So she gave us lots of like definitions, than like actual sample questions to do. So for the first couple of weeks, I wasn't really doing that much maths, I was doing like more writing and like that was a bit confusing, because last year, we literally got like ten questions to do of a workbook and we did that, but yeah.

**Interviewer**  
And do you have a preference in terms of how you learn maths?

**Caoimhe**  
I'd prefer like doing sample questions because if it's just writing, I might not like understand it, and then if she like gives me an example, then I might understand it, so I prefer doing questions myself and then like I'll understand it after a while.

**Interviewer**  
Okay, so time for you to process it and work through examples.



**Caoimhe**  
Yeah.

**Interviewer**  
Okay. You've mentioned primary school a couple of times, when you compare how you learned maths in primary school with how you're learning now, is there any other differences or similarities?



**Caoimhe**  
Um (#2), yeah, we don't like, the chapters go like a lot quicker and I think we're doing kind of similar stuff. We're doing like fractions and stuff, but it's kind of like a bit different because (#2) we're doing most of the same stuff as we kind of did last year except we're doing new things like sets that we wouldn't have done last year. Sometimes she kind of expects you to already know them, even if we might have not covered it last year.

**Interviewer**  
Do you think everyone in class feels the same about that?



Page 2 of 7

**John Behan** ...    
First use of the word information. An interesting word to use to describe learning maths.



@mention or reply

**John Behan** ...    
Shows focus on assessment, if such lists are being given out in the first few months of first year.



@mention or reply

**John Behan** ...    
Sense that this is new to her - having to study for maths tests.



@mention or reply

**John Behan** ...    
She's not enjoying the change to the approach of teaching /learning.



@mention or reply

**John Behan** ...    
Definitions and writing seem to be dominant

@mention or reply

**John Behan** ...    
She is very aware of her own learning strengths, what works for her. So far, the learning experiences don't seem to suit her.

@mention or reply

**John Behan** ...    
Teacher's expectations on students - Caoimhe's level of awareness / perceptiveness coming into play here.

@mention or reply