The Three Muscateers; An exploration of how the convergence of three elements: critical pedagogy, living theory and participatory action research spark students' epistemological curiosity to support their primary-secondary mathematics transitions in Muscat, Oman.

Joanna Elisabeth Matiti

Word count: 49,759 (45,691 from abstract onwards, excluding references)

Contents

List of Tables and Figures

Acknowledgements

Shukran to the students at ‘Oryx’ who sparked my epistemological curiosity and gave their time and energy to explore their transitions with me.

Thank you to Cassie Earl and Jan McArthur for their encouragement and guidance which is greatly appreciated.

Thanks to my family and friends for your patience and ta to my Mum, Dad and Apongozi M for being my proofreaders.

Finally, zikomo to my three Muscateers: Khama, Tumbi and Dziko. Thank you for always supporting me.

List of Publications during PhD

The convergence of living theory, participatory action research and critical pedagogy; together a methodology for empowering social justice in education.

Submitted to *Educational Journal of Living Theories*

Selected for peer review August 2021.

Students transitioning from primary to secondary mathematics learning: a study combining critical pedagogy, living theory and participatory action research.

Submitted to *Educational Action Research Journal*

Accepted for publication, January 2022.

Abstract

The convergence of three elements rooted in critical theory: critical pedagogy, living theory and participatory action research (PAR) is explored in the context of a British curriculum school in Muscat, Oman. This exploration centres on the social justice impact on students' primary-secondary mathematics transitions.

This transition is established as being challenging for many students and negatively impacts on their future lives. The literature review sets out a theoretical framework of critical pedagogy through which existing transition research and practise are examined. This evidences the significant social injustice in the pedagogy at the heart of existing transitions. The lens of critical pedagogy grounded in ontological values of critical hope, love and respect, highlights that an alternative approach is needed which empowers students to develop their epistemological curiosity in their mathematics transitions.

The methodology of living theory is explored in depth to establish a theoretical foundation for this participatory action research study. Year 6 students (aged 10-11 years) actively engaged in research to interrogate their upcoming mathematics transitions from primary to secondary school and were empowered to seek the support they needed. Two iterations of PAR were conducted over two years with a total of 192 students.

The thesis pauses for a brief reverie to discuss, with critical hope, the possibilities this participatory action research has to create wider social change. The theories of critical

pedagogy and living theory are then combined to analyse the findings. The discussion focuses on the impact this convergence of critical pedagogy, living theory methodology and PAR has on the student participants. The social justice potential of intertwining these three elements in Muscat inspires the term The Three Muscateers in honour of the social justice potential observed in this study.

The thesis contributes to the field of transition literature, answering a call for further transition research which explores methodologies to elevate students' voices. The PAR has resulted in pedagogical change to transition policy and is an example for teachers and researchers seeking to explore how students can create more epistemologically empowered and successful primary-secondary mathematics transitions through PAR framed by critical pedagogy and living theory.

Key words: Freire, critical pedagogy, living theory, participatory action research, mathematics, transition, social justice.

Chapter 1. Introduction

This study explores the challenges students experience as they transition from mathematics learning in primary to secondary schools. As a Year 6 (Y6) teacher at Oryx, a whole school encompassing both a primary and secondary school on a connected site, I have experienced how students struggle with mathematics learning after moving from Y6, their final year of primary school to Year 7 (Y7), the first year of secondary school. I have observed a pattern of students reporting feeling scared and overwhelmed and seen their confidence decline as this transition approaches. I have researched transition literature and policy to try to understand this and intervene to support the students I teach but the findings and policy I read did not reflect what the students were telling me was important to them. I could see the transition approach was not working for these students and I reflected on my earlier transition research (Blackburn, 2009) with younger four-and five-year-old students.

Throughout my teaching and in my earlier research, I have felt that students can and should be given more power in their education to say what they want to learn and how. This feeling was not rooted in any theoretical foundation and often my approach has been labelled as ‘hippyish’ with my colleagues at schools in London citing my northern English roots as the reason for my informality with the students. My earlier research centred on listening to these young children’s voices in their transition from Reception to Y1 but I did not explore the pedagogy and, with no understanding of critical pedagogy

theory, I was unaware of the hidden cause at the core of the difficulties and social injustice I could see students experiencing.

The first part of my teaching career was spent in the early years (3-5 years old) where the curriculum is covered by the Early Years Foundation Stage statutory framework (2021). The underlying pedagogy is influenced by the child-centred approach found in parts of Europe including Finland and the Reggio Emilia approach from Italy where children are given more control over their learning and freedom to select what they learn and how. In the latter part of my teaching, I have taught in Years 1-6 which are covered by a different curriculum, the National Curriculum for England (2014) and I noted how the students seemed to have less control the older they got which seemed paradoxical.

Most recently I have taught Year 6, the final year of primary school and I have seen how the students in each cohort struggle with the transition to secondary and how concerns are centred on their mathematics learning. I wondered if centring the students in transition research and practice could empower them to have more of a voice and develop their confidence in their primary-secondary mathematics transition. I could not find research which had included students as active participants and so I began to explore how I could create this.

At the onset of my doctoral studies, I set out to extend my masters' degree research in the transition from EYFS to Y1 to this mathematics transition from Y6 to Y7. I began to explore the idea of the students' identities as mathematics learners and was initially

influenced by Marsh's (1986) math self-concept and mathematical learner identity (Radovic et al., 2018; Black et al., 2010). As I conducted the pilot study, I saw the potential PAR with students had and this sparked my epistemological curiosity to investigate a living theory methodology for PAR as a praxis of critical pedagogy. As my focus shifted, I explored how the convergence of critical pedagogy, living theory and PAR to spark students' epistemological curiosity and empower them to have successful primary-secondary mathematics transitions.

1.1: Research context

Muscat is the capital city of Oman, located at the eastern tip of the Arabian Peninsula. The education system in Oman is divided into two sections; government schools which are free for Omani children and private fee-paying schools which can be attended by students of any nationality. Private schools are subdivided into those which can be attended by students from any nationality, including Omani and those which can be attended by expatriate students, called international schools. Due to the high proportion of expatriate workers in Oman, approximately 40% of the 4.5 million population (Oman Observer, 2021), there are many international schools which operate curricula from other countries, and which are attended by students from this and other countries, depending on their circumstances including home country, and future work and travel plans. These international schools include twenty-one Indian, two American, and one British curriculum school. The British school is attended by students from over thirty nationalities and follows the British curriculum for its students ranging from three to eighteen years old.

Oryx is the pseudonym for the British curriculum school in Muscat, Oman at the centre of research here. This is a whole school which encompasses both a primary and secondary school on a connected site. Each school has separate teaching staff and head teachers but share an overall principal and governing body. Both schools follow the British curriculum which covers the five different stages of compulsory education. The Early Years Foundation stage (Nursery and reception) follows the EYFS curriculum (2021), keys stages one and two (Y1-6) follow the primary curriculum and key stages three and four (Y7-11) follow the secondary curriculum, as laid out in the National Curriculum for England (2014). This means that while the schools occupy one large site, the two schools inhabit separate sections with no crossover and so primary students have no contact with the secondary school site, staff, or curriculum until they move to secondary school at the start of Y7.

This means that the transition from Y6 to Y7 at Oryx is a similar experience to that of most students who move to a new school at the start of Y7. As with other schools, transition support for students is put in place in term 3 of Y6 with students having the opportunity to visit the secondary school for a site tour, to meet teachers and have sample lessons. The existing transition support for mathematics at Oryx was a one hour visit to the secondary school mathematics classrooms for a fun based session, typically a mathematics game such as bingo.

While students at Oryx experience a primary-secondary maths transition similar to that of students at British schools, the socio-economic and cultural background of Oryx students varies considerably to that of students attending British state schools. Most students are part of expatriate families whose parents, in order to secure an employment visa for a job which can cover the Oryx school fees, are required to have at least graduate level education and be employed in a professional role. Many are engineers in the oil and gas industry which is the founding reason for Oryx school being created. While these students' socio-economic background is more privileged that the average student attending a British state school, for some Oryx students, this privilege is temporary. Many students attend Oryx for only two years before their parents' employment contract expires and they move to another country which, for some, means a return to government schools. This creates a complex picture where all students are in a position of privilege, but the degree to these varies widely. Added to this is the diversity of these third culture students attending this international school which means it is challenging and perhaps crude to attempt to apply a notion of social class to. These students bring their own varied and developing sense of class identity which, I argue, a British person such as myself must be wary of colonising with my own construct of social class. In a conscious decision to avoid imposing my nuanced British perspective of social class on the diverse international cohort of Oryx students, I omit social class from my exploration here while acknowledging this would be an area for further investigation.

1.2: Research questions

The overall aim of how we can create more epistemologically empowered and successful primary-secondary mathematics transitions through participatory action research (PAR) framed by critical pedagogy and living theory is explored in the four research questions which frame this thesis:

RQ1 According to the literature, what do we know of the transition from primary to secondary education, particularly in mathematics, and what are the underlying issues?

RQ2 To what extent does the literature consider epistemological curiosity – or other epistemological positions – in relation to primary to secondary transitions, and what are the implications of this?

RQ3 In what ways can Participatory Action Research, combined with living theory, support students to understand the primary-secondary mathematics transition, and to experience it more positively?

RQ4 What implications can we draw from the literature and this example of Participatory Action Research to demonstrate the importance of epistemological curiosity and epistemological empowerment in ensuring successful transitions?

These four research questions are based on both literature and the empirical work of this study and so they are answered in separate chapters of this thesis as is signposted in the structure of the thesis below.

1.3: The Three Muscateers: bringing together critical pedagogy, PAR and living theory

I present a review of the field of transition literature to show that the primary-secondary mathematics transition is well established as being the source of significant difficulties for students and has been extensively examined through policy and research. Despite these efforts to support students in this transition, I set out evidence that the difficulties persist, and the social injustice is worsening. Through the lens of critical pedagogy, I identify that existing transitions do not aim to develop students' epistemological curiosity. This highlights the oppressive pedagogy at the heart of current transitions as being the root of the ongoing problems. This supports my argument that an alternative approach is needed which empowers students to foster supported transition experiences. I then set out living theory as a methodology for this PAR which seeks to empower students to identify issues and action support to experience this transition more positively.

This thesis sets out an alternative for transition research: PAR framed by critical pedagogy and living theory with the students empowered as co-researchers. Two iterations of PAR is conducted over two years with 36 Y6 students to explore and support their transition. In total, 192 Y6 students share their attitudes towards their

mathematics learning before and after the transition support present the findings of our PAR together with my analysis of the importance of epistemological curiosity and epistemological empowerment in ensuring successful transitions.

I conclude by discussing the implications for practice and the contribution this thesis offers to the field of knowledge. I close with my reflection on how the convergence of three elements: critical pedagogy, living theory and PAR sparked these students' epistemological curiosity to support their primary-secondary mathematics transitions.

1.4: Contribution to Knowledge

I identify a gap in the field of transition literature since there is no existing research which explores this primary-secondary mathematics transition with students as active, epistemologically empowered participants. This thesis addresses this gap and offers a contribution to the field of transition literature, reporting how research with young students as active, co-researchers can create supported transitions, redressing the ongoing social inequalities in this transition.

This study is situated in Muscat, Oman where no existing transition research has been conducted and so this study explores new territory, extending the field of transition literature. Additionally, the findings of this PAR have changed the transition policy at Oryx, giving an example for teachers and researchers of how the dominant pedagogy can be changed in a meaningful way, supporting positive change in other settings.

1.5: Structure of this thesis

The thesis is grounded in a commitment to social justice in the exploration of supporting students in their primary-secondary mathematics transitions. The structure of the thesis reflects this, with the findings reported rather late in the thesis to allow space to explore the research questions which are based on literature as well as the findings of the PAR. The first of the four research questions are answered in chapters two, three and four of this thesis, with the final research question explored in depth in chapter seven.

I begin in chapter two by introducing the primary-secondary mathematics transition to give context to this exploration. I set out the difficulties and social inequalities resulting from this transition which is seen as been challenging for many students. This addresses the first research question of how the existing educational literature represents the idea of successful primary-secondary mathematics transitions. I identify a limitation in the pedagogy of current transition research which leads me to explore an alternative approach.

In chapter three, I set out my interpretation of critical pedagogy to frame an alternative, epistemologically empowered approach to this transition. This frames a review of literature from the field of transitions to answer the second research question, to what extent does the literature consider epistemological curiosity – or other epistemological positions – in relation to primary to secondary transitions, and what are the implications of this?

I build on this exploration of theory in chapter four, exploring living theory as a methodology for this research. I discuss in what ways PAR combined with living theory, can support students to understand the primary-secondary mathematics transition, and to experience it more positively. This addresses the third research question of this thesis. In chapter five, I set out the methods of data collection and analysis, and the ethical considerations of this PAR.

The possibility this research has for wider social change is discussed in chapter six where I pause to reflect on the possibilities of this PAR. I then present the findings of this PAR in chapter seven, discussing the final research question of what implications we can draw from the literature and this example of PAR to demonstrate the importance of epistemological curiosity and epistemological empowerment in ensuring successful transitions? This thesis then concludes in chapter eight which highlights the contributions to knowledge I offer and draws on the of critical pedagogy, living theory and PAR here to spark students' epistemological curiosity and support their primary-secondary mathematics transitions. This powerful convergence of critical pedagogy, living theory and PAR in our school in Muscat, Oman is, I argue, a reinvention of the three Muscateers: a powerful trio working for social justice.

Chapter 2. Ways of Understanding Primary-Secondary Mathematics Transitions

2.1: Background to primary-secondary mathematics transitions.

Transition can be understood as “moving from one environment and set of relationships to another” (Sanders et al, 2005:9) and, in the context of the primary-secondary transition under focus here, this transition is when ten-and eleven-year-old students complete the final year of primary school, Year 6 (Y6) and move to secondary school where they begin their first of five years of compulsory secondary schooling in Year 7 (Y7). While some countries, such as the USA and New Zealand, have a three-tier school system, most students in the UK experience this primary-secondary transition at the end of Y6, as in the case for students at Oryx.

The transition from primary-secondary school is a significant event in students’ lives. Having graduated to being the oldest in their primary schools, they revert to being the youngest students, mixing with students up to eighteen-years-old; veritable giants to the average eleven-year-old. Approximately half a million UK students (Howe and Richards, 2011) experience this transition annually. While students may be materially ready for this transition with their new school uniform and fully equipped pencil cases, they are less emotionally prepared, resulting in the negative impact of the transition on their emotional (Bharara, 2020, Van Rens et al., 2018) and academic (Grootenboer and Marshman, 2016, West et al., 2010) development.

It is a requirement (Oftsed, 2021) for English state schools to implement a transition policy to support students navigating this challenging experience. This applies also to schools which are accredited as British Schools Overseas (BSO), which Oryx is. Such policy is written by teachers guided by statutory guidance including the National Curriculum (2014), regulatory advice (Ofsted, 2021), and best practice, including research findings. Therefore, in most schools, the transition policy reflects the dominant pedagogy of the education system and social science research, which, as I will set out shortly, I find to be the traditional, oppressive pedagogy. This is seen at Oryx in the extract from the mathematics policy relating to transition (Appendix 1) which sets out that teachers alone will determine the content of the transition support session, based on what they think are relevant issues for the students.

The extent of difficulties students encounter and the resulting social injustice from this transition have prompted much interest from researchers and the transition is universally acknowledged (Jindal-Snape and Cantali, 2020) to be unsuccessful for many students, involving significant challenges and negatively impacting students. This has prompted myriad research studies to resolve these transition difficulties which will now be examined.

2.2: Transition literature

This primary-secondary mathematics transition is, I argue, a site of social injustice. The pedagogical approach of present transition research and policy is not working, as

evidenced by the unresolved student difficulties reported by transition literature. While I am aware that policy and research are distinct phenomenon, I refer to them interchangeably as this reflects the students' transition experience where the impact of transition research and policy are intertwined. In my review of transitions, I critique much of the existing literature as being overly paternalistic while drawing on these findings to support this exploration here which seeks to offer an alternative, empowering approach.

I began by exploring three comprehensive reviews of transition literature (Van Rens et al., 2018; Hughes et al., 2013; Rice et al., 2011) which examined research from different education systems throughout the world to identify relevant literature to review. I followed leads within these references to explore the wider field of transitions as well as transitions relating more specifically to mathematics and the primary-secondary move. I used a combination of search terms including 'transition' 'mathematics', 'primary–secondary school', 'child voice' on Lancaster University's library OneSearch to identify further pieces of literature. Once my reading began to reference the same literature, I felt confident that I had sufficiently identified relevant literature. I focused on literature from the past twenty years as I felt literature predating this would not relate to transition practice experienced by students at the heart of this study.

The findings of the large-scale, longitudinal study, the Trends in International Mathematics and Science Study (TIMSS) provide compelling evidence of an unresolved trend internationally of student difficulties in their mathematics learning which is linked to

their transition to secondary school. The three reviews of international transition literature (Van Rens et al., 2018; Hughes et al., 2013; McGee et al., 2003) show there is “substantial agreement” (McGee et al, 2003:12) amongst the findings that the primary-secondary mathematics transition is problematic for most students. This enables the conclusions from the field of transition to be applied to the context here of students from varied nationalities attending a British curriculum school in Oman.

The move to senior school comes at a time of considerable change in these students’ lives as they “traverse puberty” (Anderson et al., 2000:326), transitioning from young child to teenager, resulting in this transition being “a critical time for students” (Wassell et al., 2007:49). The concurrent timing of the school transition with a period of physical and emotional transition to adolescence has, historically, “complicate[d] matters” (Anderson et al., 2000:326), leading to a view that students’ problems were due to their own developmental changes (Anderson et al., 2000).

More recent research (Van Rens et al, 2018; West et al., 2010; McGee et al, 2003) has concluded, however, that the difficulties are “caused by the transition itself” (Van Rens, 2018:45) rather than other factors such as their age. As described above, the age of transition differs between countries and yet the “same pattern of a drop in attainment occurred in the first year of secondary school" (McGee et al., 2003:11), creating a causal connection between the transition and the students’ difficulties:

> International data are consistent in revealing a 'dip' in attainment following transfer to secondary school, the significance of which is increased because it occurs at different ages in different educational systems, thereby making other explanations (e.g., pubertal onset) less likely (West et al., 2010:24)

The primary-secondary mathematics transition is “multifaceted” (O’Meara et al., 2020:1) with significant organisational and social (Van Rens et al, 2018; Anderson et al, 2000) changes. This transition “is accompanied by several changes in both the school environment and in the social context” (Van Rens et al., 2018:43) including moving to a new school building, mixing with new students, curriculum changes and the switch from having one teacher for all subjects to being taught by up to thirteen subject specific teachers. Anderson et al. (2000) state this transition is “difficult for most students and especially problematic for some” (2000:325). As well as impacting on academic development (Cantley et al., 2020; Grootenboer and Marshman, 2016; West et al., 2010), literature shows that this transition to secondary can negatively impact on students’ social and emotional well-being (Bharara, 2020; Paul, 2014; Hughes et al., 2013; Rice et al., 2011 and Zeedyk et al., 2003), levels of motivation (Chambers, 2019; Van Rens et al., 2018) and confidence (Prendergast et al., 2019; TIMSS 2019, 2015; Van Rens et al., 2018; Attard, 2010; West et al., 2010) and general happiness (Ashton, 2008).

A successful transition is defined here as the students feeling confident, motivated, and supported in learning mathematics so that they can attain key life skills needed to be happy and healthy. Learning mathematics is important for social justice since a solid grasp of mathematics can bring opportunities to access well paid jobs and for people make informed financial decisions in their lives, “enabling them to seek their legitimate share of the benefits in their society while contributing to its positive development.” (Tanko, 2012:51). Gustein (2005) links mathematics learning to an understanding of social justice issues:

> they need that mathematical sophistication and maturity to access advanced education and understand mathematical issues embedded in complex phenomena like racism and other injustices (Gutstein, 2005:199).

The importance of positive attitudes and a successful mathematics transition is supported by “many studies [which] have shown a correlation between students’ attitudes towards mathematics and their attainment in the subject” (Prendergast et al., 2019:246). Therefore, the impact of the transition on students’ positive attitudes towards their mathematics learning in Y6 and Y7 is important to this study. Existing literature establishes that transitions can have a long-term negative impact on students’ attitudes. Successful primary-secondary transitions are considered “important for psychosocial well-being” (Hughes et al, 2013:24) but literature reports this transition “almost always a

considerable period of stress and anxiety" (Zeedyk et al., 2003:68) and results in the reported decline in attitudes which is now discussed.

The transition, including its challenges is viewed as a "key rite of passage" (Chedzoy and Burden, 2005:16), a developmental process all young students must go through as part of their personal growth:

> Transitions in individuals' lives have always demanded emotional reorganisation, and in this internal landscape anxiety is for most not only an inevitable consequence of the transition but central to the development of effective coping strategies (Lucey and Reay, 2000:192)

I disagree with this sense that the difficulties students experience, and the resulting social injustice are "inevitable" (Lucey and Reay, 2000:192), or a "rite of passage" (Chedzoy and Burden, 2005:16) which students should accept as part of their childhood. As Freire states, "I have always rejected fatalism. I prefer rebelliousness." (2001:103) and I agree, rejecting what I see is a normalising of the considerable difficulties students experience and the resulting social inequalities and instead explore a socially just alternative.

The extent of the difficulties some students experience in this transition is evidenced by TIMSS data. Conducted every four years, this study reports an ongoing trend over the past twenty-four years of students' attainment and attitude decreasing significantly after the primary-secondary transition. The decline in students' attitudes is seen in the lower levels of confidence regarding mathematics (Table 1).

Table 1: TIMSS (2019) Report comparing grade 4 and grade 8 students' confidence

Confidence	Grade 4	Grade 8
Very confident	32%	15%
Somewhat Confident	44%	42%
Not confident	23%	44%

The TIMSS (2019) report shows that students' confidence in mathematics declines sharply following the move to secondary school. While 32% of Grade 4 (9-10-year-old) students say they are very confident about mathematics learning, this drops to just 14% by Grade 8 (13-14-year-olds). Conversely, while only 23% of younger students feel not confident about mathematics, this increases significantly to 42% post-transition. This is supported by other literature which reports that the transition brings a "danger of students developing negative attitudes towards their school, their relationships with teachers, and teaching and learning." (Prendergast et al., 2019:243).

The primary-secondary mathematics transition under examination here is especially significant since the challenges in mathematics learning and “deleterious effects on student achievement and motivation in mathematics” (Cantley et al., 2020:1) during this transition are acute, “with the negative effects more pronounced for mathematics than for any other subject.” (O’Meara et al., 2020:2)

There are considerable pedagogical differences between primary and secondary mathematics teaching (Paul, 2014; Topping, 2011; Attard, 2010). From Y7 onwards, mathematics “teaching is more didactic and attainment seen as more important” (Topping, 2011:280). These changes can result in students who enjoy and thrive in mathematics at primary school becoming disengaged from secondary school onwards (TIMSS, 2019, 2015). Attard (2010) describes the “decline in school mathematics engagement of many young adolescents when compared to their engagement in primary school” (2010:54). There is a need to develop an “understanding (of) how pedagogy impacts on students’ dispositions towards studying mathematics” (Black et al., 2010:58) to address the ongoing decline in confidence, motivation, and enjoyment in mathematics from secondary school onwards (TIMSS, 2019, 2015). In the review of transitions literature, the impact on confidence and sense of voice drew my attention and I focus on these two attitudes.

The primary-secondary transition has been “extensively studied” (Rigby, 2017:503) but "very little has included the voices of school students" (Grootenboer and Marshman,

2016:35). The views of the main stakeholders in this transition, the students have not yet been fully explored:

> In spite of this, pupils' views are rarely heard in discussion of transition from primary to secondary school (Chambers, 2019:221)

Van Rens et al. (2018) agree that "little is known about the role of children as the owners of their learning process" (2018:44). In their comprehensive report, Evangelou et al. (2008) found that only half of students had received basic information about their transitions and just 13% of students were talked to individually during their transitions. When students are consulted in transition research or practice, they are positioned as passive research objects, their views collected as data which is then analysed and filtered by the epistemologically empowered adults. I find support from transition literature (Jindal-Snape and Cantali, 2020; Berson et al., 2019; Groundwater-Smith and Mockler, 2019; Chambers, 2019; Van Rens et al., 2018; Grootenboer and Marshman, 2016; Zeedyk et al., 2003) to support my view that the voice of students in existing transitions is not truly heard:

> student consultation and research activities are often little more than tokenistic interventions serving established power (Groundwater-Smith and Mockler, 2019:29).

While there any many examples of research on transition which does not include students (Bharara, 2020; Prendergast et al., 2019; O'Meara et al., 2020; Van Rens et al., 2018; Grootenboer and Marshman, 2016) or positions students as passive participants (Jindal-Snape and Cantali, 2020; Heinsch et al., 2020; Chambers, 2019; Rigby, 2017; Neal et al., 2016), there is no existing research by students and this results in students' concerns not being heard. Zeedyk et al. (2003) found a mismatch between students' concerns and the transition practice, finding that teachers listened to transition policy rather than students. This "absence of any direct consultation with the children involved in the transition " (Van Rens et al., 2018:54) leads to a call for further research which centres of the students' perspectives (Berson et al., 2019; Groundwater-Smith and Mockler, 2019; Van Rens et al., 2018; Zeedyk et al., 2003). Berson et al., (2019) state there is a need to explore methodologies to elevate children's voices which are unheard in transition research. I argue that PAR with students as participants to co-construct what is needed for a supported transition can redress this gap in the field of transition research.

The lack of voice is, I argue, connected to the reported decline in confidence (Prendergast et al., 2019; TIMSS 2019, 2015; Van Rens et al., 2018; Attard, 2010; West et al., 2010) as students cannot ask for the help they need. Instead, transition research and practice has focused on the paternalistic approach of determining for the students what is in their best interests and without authentic consultation where students are

epistemologically empowered to explore the transition and identify relevant issues, this results in transition support which misses the mark. Existing transition practises "frequently pay little attention to peer relationships or the importance of friendship during the transition process" (Van Rens et al., 2018:51) despite transition studies reporting these issues as being significant to students (Jindal-Snape and Cantali, 2020; Van Rens et al., 2018; Zeedyk et al., 2003). Instead, existing transition research and practice focuses on academic attainment rather than the social and emotional concerns which are more pressing for the students:

> perhaps this focus on academic attainment is unfortunate at a time when children and indeed parents are more focused on the social and emotional aspects of transitions (Jindal-Snape and Cantali, 2020:1258)

I connect this lack of voice and agency to identify and action support for relevant issues in the transitions with the decline in confidence as students feel unsupported to be able to positively navigate the primary-secondary mathematics transition.

Mathematics learning in secondary school is a concern and anxiety for many students (O'Meara et al., 2020; Attard, 2010) and 'feeling confident in mathematics [is] strongly associated with higher average achievement' (TIMSS, 2019), affecting their future life chances (Attard, 2010) and overall wellbeing (Bharara, 2020; Paul, 2014; Hughes et al.,

2013; Rice et al., 2011; Zeedyk et al., 2003). Therefore, students' confidence in their mathematics learning is significant during this transition.

However, TIMSS (2015) reports the ongoing twenty-four-year trend of a decline in students' confidence is worsening over time with a decrease found in sixteen countries while increasing in only seven. The most recent TIMSS report (2019) showed students sense of confidence post-transition declining by 50% with a 50% increase in the students feeling least confident (Table 1).

This finding is echoed by transition literature which describes students' confidence in their mathematics learning as becoming fragile in this primary-secondary transition:

> as the transition to secondary school drew closer, students' confidence in themselves became fragile, thus affecting their attitudes towards the subject (Prendergast et al., 2019:246)

Therefore, I find a correlation between students' sense of confidence and their primary-secondary mathematics transition since the decline in confidence is connected to both the transition (Van Rens et al., 2018, West et al. 2010) and mathematics as a subject (O'Meara et al., 2020; Prendergast et al., 2019; TIMSS, 2019, 2015; Paul, 2014; Attard, 2010; West et al., 2010). The decrease in students' confidence is persisting and worsening which justifies further examination and, I argue, investigating an alternative

approach. This supports the exploration here of how students' confidence in their mathematics learning is impacted by this PAR.

While for some students the negative impacts of the transition "are fairly small and short-lived." (Anderson et al., 2000:326), for others they are significant and long-lasting. The transition exacerbates difficulties students may have in primary school, with Hutchinson et al. (2018) reporting that England's mathematics attainment gap at the end of primary school widens from 9.4 months to 18.4 months at the end of secondary school. The authors signal the social injustice of this, cautioning that the slow pace of narrowing this gap risks "stagnating or even worsening social mobility" (2018:6).

Van Rens et al.'s (2018) agrees that there are significant social inequalities resulting from this transition, citing the impact of "socio-economic factors, socio-ethnic factors/race, gender, prior problem behavior and low academic achievement" as all being important in the reported transition difficulties (2018:45). Evangelou et al.'s (2008) large-scale study in the UK similarly found a correlation between students with low socio-economic households experiencing more difficulties post transition to secondary school.

2.3: Limitations in existing transition literature

I identify the paternalism of existing transition literature and policy as a shared limitation. Despite this limitation, the existing transition literature does elicit information which

supports this exploration. The literature indicates the social injustice impact when reporting that many students experience a decline in their confidence and sense of voice in their primary-secondary mathematics transition.

The existing transition approach is successful for many students. For some, the current pedagogical approach will suit their needs and for some of those who experience difficulties, these may be relatively minor or short-lived (Anderson et al., 2000:326). However, for many others the current approach results in unsuccessful transition experiences which have significantly negative impact on their mathematical learning (Cantley et al., 2020; TIMSS, 2019, 2015; Grootenboer and Marshman, 2016; West et al., 2010) and overall wellbeing (Bharara, 2020; Tanko, 2015; Hughes et al., 2013; Gustein, 2005).

When reviewing the field of transition literature, I observed a common limitation in the lack of student empowerment in the research. All the research either was on behalf of students (Bharara, 2020; Prendergast et al., 2019; O'Meara et al., 2020; Van Rens et al., 2018; Grootenboer and Marshman, 2016) or with students participating passively (Jindal-Snape and Cantali, 2020; Heinsch et al., 2020; Chambers, 2019; Rigby, 2017; Neal et al., 2016) to answer questions but with no power to determine the research outcomes or action what they want. This passive positioning of students, I suggest, limits their role, oppressing them in the research and leaving them with a sense of having no voice to say what it is important to them leaving them feeling unsupported in

their transitions and, consequently, they lack confidence about how they can continue to learn mathematics in Y7.

This observation, I argue, explains why some students lack confidence and feel they have no voice. Transition research and policy positions students as passive objects, incapable of determining what would support them in their mathematics transition. The result, I argue, explains why transition literature has not resolved students' difficulties because this creates a vicious cycle of social injustice. Students lack a voice to say what issues they have and what support they need and so they feel less confidence in the transition being positive for them. Difficulties experienced in the transition exacerbate the students' declining confidence and with no sense of voice to be able to redress this, they encounter more challenges in their Y7 mathematics learning and their wellbeing and attainment drops.

There is evidence (TIMSS, 2019, 2015; Hutchinson et al., 2018) of an attainment gap which widens post transition between students from different social classes. TIMSS (2015) highlights that students of lower social class who perform highly pre-transition perform worse than their peers with higher social class following the transition. This highlights the negative impact of this transition on students from lower social class which indicates social injustice. This gap is not being addressed with Hutchinson et al. (2018) reporting that the present efforts are ineffective and that "the gap at the end of secondary school would take over 100 years to close" (2018:11).

Class, gender, and ethnicity are important issues which absolutely need addressing but the focus on class is vital if we are to “remain ever cognizant to the centrality of social class oppression in shaping the conditions students experiences within schools” (Darder, et al., 2017b:17). Reay (2006) aims to “reclaim social class as a central concern within education” (2006:288) and this PAR framed by critical pedagogy and living theory methodology has, I argue, the potential to support this aim in British schools but this is not the focus of this study, given it is situated in an international British school.

Oryx is a fee-paying school with students from diverse, international backgrounds and so it is not possible in this context to explore the impact PAR has on redressing social inequalities associated with the British social class system. Class matters to these students, but it matters differently in their context. The findings of this study have potential to support students in other schools to redress these social injustices relating to social class.

While Oryx students occupy a position of economic privilege, they experience other sources of disadvantage including but not limited to discrimination based on their gender, age, ethnicity, and nationality. While the thesis does not explore these areas, they are present in these students’ lives and impact on their primary-secondary maths transition. This also includes the power imbalance between student and teacher which is discussed further in the ethics section of chapter five.

The conscious exclusion of students from an active role in transition research and practice evidences the low priority of them in the oppressive pedagogy at the heart of these transitions. Therefore, I concur with Van Rens et al.'s (2018) conclusion that "there is a need for further research" (2018:54) which positions the students at the heart of this transition in an empowered stance to explore and shape their transition experience, identify what issues are relevant to them and what support they need to have a positive start to mathematics learning in secondary school. To date, there is no evidence of this which underpins the potential value this thesis has to contribute to the field of transitions and redress the legacy of social injustice.

The timing of research into the transition varies, with some literature focused on Y6 students, some on Y6 and Y7 students during the transition, and some on Y9 students post transition. West et al. (2010) criticise existing research for being "inconsistent and incomplete" (2010:22) with the varying timings and foci resulting in a lack of "continuity, the focus shifting over the last two decades" (2010:22). Both West et al. (2010) and TIMSS (2019, 2015) centre on the longer-term impact of transitions, conducting research on Y9 students but the focus of this PAR is research *with* the Y6 students as they experience the transition. Exploring the transition with Y6 students during their transition, rather than afterwards, is timed to explore the concerns and confusions Y6 students have shared with me.

2.4: Introduction conclusion

The current approach to transition research and practise has been explored to address RQ1 According to the literature, what do we know of the transition from primary to secondary education, particularly in mathematics, and what are the underlying issues? I argue that this transition is problematic for many students, negatively impacts on students' emotional and academic development and results in social injustices. I have identified a shared limitation in the pedagogy of existing literature oppressing those at the centre of these challenging transitions, the students. Following this observation, I turn to critical pedagogy literature to frame an understanding of the extent to which existing research and literature on primary-secondary mathematics transitions consider the idea of epistemological curiosity.

Chapter 3. The Role of Epistemological Curiosity in Successful Transitions: Insights from Freire

3.1: Introduction

The previous chapter establishes that the primary-secondary mathematics transition is an area of difficulty for many students, negatively impacting their academic attainment and emotional wellbeing. Despite the efforts of school transition policy and the wealth of transition research, the difficulties persist (Hutchinson et al., 2018). From this review, I concluded that the pedagogy of existing transitions has a shared limitation of excluding students from meaningful participation and oppressing them in their transitions. I now set out to explore the pedagogy at the heart of transitions through the lens of critical pedagogy. This chapter has two parts: part one reviews critical pedagogy to create a theoretical framework and part two is an examination of existing transition literature through this framework.

Part one presents my reading of critical pedagogy, exploring Freire's writings to develop an understanding of what epistemological curiosity is and what role it plays in this transition. I begin by looking at pedagogy generally, before discussing critical pedagogy and then focusing on Freire. I set out my interpretation of Freire, discussing his ontological position and key concepts of banking education, praxis, and conscientization. From this theoretical framework, I identify three indicators of a praxis of critical pedagogy which sparks epistemological curiosity: active participation, identifying and actioning support for relevant issues, and a positive impact on students' voice and confidence.

In part two, I revisit the transition literature through this critical pedagogy lens, searching for evidence of these three indicators. This builds on chapter two's review of transition literature and addresses the second research question: to what extent does the literature consider epistemological curiosity – or other epistemological positions – in relation to primary to secondary transitions, and what are the implications of this?

Part I

3.2: Critical pedagogy

Pedagogy, defined here as the theory and practice of teaching and learning, can be a source of social justice or injustice; an instrument of oppression or "the practice of freedom" (Freire, 1970/1993:54). The current pedagogy which permeates schools internationally creates significant social injustice (Giroux, 2018). The focus here is on the oppressive pedagogy prevalent in most schools as experienced presently by billions of students which has pitched education into "dark times" (Aronowitz, 2001:4) with a current "bleakness" (Giroux, 2018:122) seeping into students' experiences. Gutstein's (2005) commentary on mathematics learning in the USA finds that "it is now more important than ever to teach for social justice due to the current national and global political climate." (2015:16). Harber (2004) describes schooling as "violence carried out against learners" (2004:40) echoing Gatto's (1977/2010) damning description:

> wake up to what our schools really are: laboratories of experimentation on young minds, drill centers for habits and attitudes that corporate society demands. Mandatory education serves children only incidentally; its real purpose is to turn them into servants. (1977/2010:19)

Much of the field of critical pedagogy I draw on is from North American theorists but I find support from Freire to apply these to Oryx, the British international school in Muscat. Freire actively “welcomed heterodoxy, carnivalesque readings, and the reader's appropriation of his words” (Apple et al., 2009:234). Amsler (2013) agrees, describing how Freire advocated for an “attitude of permanent openness” (2013:76) to questioning and being questioned in diverse contexts. This ongoing critique and development of ideas is described by Giroux as resulting in “border crossings” (2005:20) into new territories such as the application of critical pedagogy to frame this PAR.

Critical pedagogy is “fundamentally concerned with understanding the relationship between power and knowledge.” (McLaren, 2017:67). A critical pedagogue is chiefly concerned with “emancipatory knowledge” (McLaren, 2017:59) which educates the holder with a powerful understanding of social justice. Critical pedagogy is “as diverse as its many adherents” (McLaren, 2017:56) but Giroux (2018) highlights the common ground in the shared belief:

> no democratic society can survive without a formative culture shaped by pedagogical practices capable of creating the conditions for producing citizens who are critical, self-reflective, knowledgeable (Giroux, 2018:3)

I draw on Amsler's (2013) understanding of critical pedagogy which sets out the connection between this pedagogy of education and social justice and emphasises the link to social change for the stakeholders, that "critical pedagogy must be linked to concrete problems, desires and struggles." (2013:200):

> It offers tools for conceptualizing how we can come to understand the world in critical, autonomous ways that enable us to liberate ourselves and one another emotionally, intellectually and socially. (Amsler, 2013:199)

Critical pedagogy "draws attention to the ways in which knowledge, power, desire, and experience are produced" (Giroux, 2018:4). This branch of critical theory situates the school as a site of social justice. A school may act as an "arena of indoctrination or socialization or a site of instruction, but also as a cultural terrain that promotes student empowerment and self-transformation." (McLaren, 2017:57). Critical pedagogy is, therefore, a lens for viewing the social justice of the pedagogy in schools. I turn this lens on existing mathematics transition literature, to illuminate the social justice inherent in the current pedagogy.

The pedagogy of schools is viewed by critical pedagogy as part of the hegemony in society. For Gramsci (1971), hegemony is the supremacy of one group over other groups “established by means other than reliance on violence or coercion.” (Fontana, 2008:86). Gramsci (1971) posits that in addition to political and economic control, the ruling capitalist class maintain control in a capitalist society through ideology. By establishing ideology which suits the elite’s interests into societal norms, the elite create a hegemonic culture which manifests “moral and intellectual leadership (direzione)” (Gramsci, 1971:57). As this is normalised into societal values, the working class adopt this ideology, further entrenching the elite’s powerful position. Gramsci used his concept of hegemony to explain how powerful elites maintain their oppression without revolution, stating that hegemony exists in societies which are “both liberal and democratic” (Riley, 2011:3), resulting in the oppression of people with their own consent and, sometimes, their active participation in the maintenance of their own oppression.

This is, I argue, a particularly destructive form of social injustice since the oppressed; the students, their families, and the teachers, reinforce their own oppression. I adopt Gramsci’s definition and identify examples of hegemony littering education systems throughout the world. Parents breed obedience in their children by encouraging them not to question the teacher’s authority and teachers embed this in their practice when they assume their position at the front of their class and talk at students, capitalising on their empowered stance to quell any potential rebellion. Students accept and replicate

this, quickly learning how to behave or chasing and “perpetuating the myth of individual achievement” (McLaren, 2017:62).

The common form of students’ resistance is described by Shor (1996) as the Siberian syndrome where students disengage by sitting as far as possible from the teacher and refuse to participate actively. This, however, only serves to entrench the hegemony. This illustrates that “hegemony could not do its work without the support of ideology.” (McLaren, 2017:64). Eagleton (2011), the prominent thinker on ideology states that “by ‘ideology’, I mean, roughly, the ways in which what we say and believe connects with the power-structure and power-relations of the society we live in.” (2011:13). I adopt this loose definition here to understand how ideology is fed into education through the pedagogy to create the hegemony. The ideology discriminates against many, against people of colour, the poor, females, or males, depending on the whim of the oppressors in each setting. The prejudice in current pedagogy seeps into the hegemony, creating a total oppression of students in education:

> There is little or no discussion of the way in which the attitudes and values of those from materially privileged classes are imposed upon everyone via biased pedagogical strategies. (hooks, 2017:182)

Whereas in a hegemony the “dominant culture is able to ‘frame’ the ways in which subordinate groups live” (McLaren, 2017:63), a critical pedagogy democratises

knowledge. I set out my understanding of Freire's ontological and epistemological position to justify critical pedagogy as a theoretical framework for this research. I focus on Freire's key concepts of conscientization and praxis to understand his epistemological position and frame a review of current literature to explore what impact developing epistemological curiosity has on students' attitude in their mathematics transition.

3.3: Freirean critical pedagogy

3.3.1: Introduction

Freire was a Brazilian philosopher, social activist, and educator whose ideas continue to have a significant impact on education. He is described as the "main scholar" (Veugelers, 2017:412) in critical pedagogy and his light and legacy continue to shine brightly within the education community. Freire is described as an "epistemologist of the South" (Darder, 2018:ix) who fought against the "Western epistemological elitist gaze" (Darder, 2018:xii). His ideas, first developed through his work with Brazilian adult literacy students, continue to have an "international resonance" (Martinez Gomez, 2015:57) and have been further developed by myriad researchers including Darder, hooks and Brydon-Miller. While many well-respected critical pedagogues hail from North America, Freire's work has inspired others internationally including Amsler (2017, 2013), Wright (2021, 2017) and Coughlan (2014). This is relevant for Oryx, the British international school where this study is conducted.

Freire is often misunderstood and applied inaccurately, resulting in “pedagogical applications that are often patronizing and theoretically naïve.” (Brady, 1994:145). There is, however, considerable support for the criticism that Freire’s earlier work is sexist. This warrants exploration, if this theory is to be used to frame social change for both female and male students.

Ellsworth states critical pedagogy is flawed for its “rationalist assumptions that give rise to repressive myths” (1989:297). Brady (1984) criticises Freire specifically for failing to address issues of gender, stating Freire “subsumes experience and cultural practice within a patriarchal discourse” (Brady, 1984:143). Giroux accepts that “Freire’s earlier reliance on emancipation as one and the same with class struggle sometimes erased how women were subjected differently to patriarchal structures” (1992:178). McLaren agrees, stating that Freire’s work “must be extended in order to allow women as well as minorities to emerge as critical, social actors on the stage of human transformation and struggle” (McLaren and da Silva, 1992:66). hooks also acknowledges that Freire’s work demonstrates a sexism both through the “sexism of the language” (hooks, 1992:147) and constructing “a phallocentric paradigm of liberation” (hooks, 1994:49).

Freire responded to this criticism of sexism (2019, 1992), acknowledging this was not only “valid but very timely” (Freire et al., 1992:168) and committing to change. Reflecting on the sexism present in his earlier work, Freire committed to “take a sharper focus” (1992:169) and determined to “express my rejection of sexist language.”

(2019:57). In his later work, Freire acknowledged the differences in positions of privilege of men and women, stating the need of both to “understand their different positions in the oppressive structures so that together they can develop effective strategies and cease to be oppressed.” (1992:172). Freire argued people must fight a “collective war against all oppression” (1992:172), seeking to rise together, leaving no one behind.

Freire embraced others critiquing and developing his work, stating that “deep down, this must be every author's true dream-to be read, discussed, critiqued, improved, and reinvented by his/her readers” (2018:31). hooks (1992, 1994) highlights this is in keeping with critical pedagogy where knowledge is co-constructed and not owned by Freire any more than any other member of society.

While the criticism of Freire’s writing being sexist is well established as having merit (Freire, 2019, Amsler, 2013, hooks, 1994, 1992, Giroux, 1992, Ellsworth, 1989, Brady, 1984), Freire’s openness to others further developing his theory offsets this limitation. This ensures critical pedagogy can be used as a theoretical framework for research seeking to empower female and male students. hooks (1992) argues that this critique does not invalidate critical pedagogy, stating “I never wish to see a critique of this blind spot overshadow anyone’s (and feminists in particular) capacity to learn from the insights.” (1992:147). Amsler (2013) agrees, stating “this does not mean abandoning the radical promises of critical pedagogy…where they are so obviously required.” (2013:80). McArthur (2021) demonstrates the power of critically engaging with others’

work which has flaws in her explanation of how Fraser critically engages with Habermas, despite similar sexist limitations. Rather than “throwing the baby out with the bathwater” (McArthur, 2021:2), we can engage with others’ “work critically to demonstrate omissions and assumptions based on stereotypical views of the male-dominated nuclear family and use these to progress the shared critical theory project, which undoubtedly must include feminism.” (2021:2).

I apply McArthur’s (2021) point to Freire and align with hooks (1992) and Amsler’s (2013) view that this limitation does not negate Freirean critical pedagogy. While critical of his earlier work, hooks (1992) is unequivocal that a strength of Freire’s work is “in its global understanding of liberation struggles” (1992:146). This makes Freirean critical pedagogy relevant for the students at Oryx who come from over 30 countries.

Common to critical pedagogy is an attempt to understand “how power works through the production, distribution, and consumption of knowledge within particular institutional contexts” (Giroux, 2018:157). Freire’s epistemological position is key in critical pedagogy being an empowering and emancipatory theory to frame this PAR. Freire fought to amplify marginalised voices who he believed could, and should, co-construct knowledge to effect positive social change to improve their lives.

Freire proclaims that “education is politics!” (Shor and Freire, 1987:46) and that traditional pedagogy is grounded in a theory of knowledge acquisition which empowers

the elite minority and oppresses the masses. Current education is focused on monopolising control of knowledge production to retain power and create a docile workforce. Pedagogy is "controlled from above as means to impose the dominant culture on each new generation of students" (Shor, 1992:27).

Politics underpins the pedagogy in schools from the curriculum studied to the policies which govern teaching and learning practices. The pedagogy permeates the culture of classrooms from the seating alignment Shor (1996) highlights with teachers afforded the relative luxury of the "unique leatherette teacher's chair" (1996:38) designated for their sole use while students are consigned to sit on rigid plastic chairs, to the more subtle examples such as the "silences typically surrounding unorthodox questions and issues in traditional classrooms." (Shor, 1992:26). For Freire, the reach of pedagogy extends beyond schools and into wider society:

> For Freire, pedagogy is seen as a cultural practice and politics that takes place not only in schools but in all cultural spheres. (Giroux, 1992:180)

Freire believed the politics of education should be democratic and emancipatory, focused on the "construction of critical agents" (Giroux, 2018:4). Students should be critical agents in their own learning, including but certainly not limited to, their primary-secondary mathematics transitions. Critical pedagogy provides the conditions for students to recognise how knowledge is bound in power and politics, empowering them

as experts to co-construct knowledge and supporting a more egalitarian, socially just society.

Gutstein (2005) builds on Freire's ideas, applying them specifically to mathematics learning, developing the term critical mathematical knowledge. This has been applied in a recent study in UAE, a neighbour to Oman. Tanko (2015) conducted research to explore social justice in mathematics learning with adult females identified the lack of critical pedagogy and further commented that "Very little work has been published on teaching for social justice in the Middle East" (2015:51), a claim I seek to redress with this thesis focused on our PAR in Oman.

There are limitations inherent in the PAR recounted here since it is situated within the pedagogy of the current education system. Here, I focus on how this research develops the students' epistemological curiosity, positioning them as critical agents in their transitions. This has a dual aim of mitigating the negative impact of the existing pedagogy in the primary-secondary mathematics transitions and, secondly, of contributing to the goal of critical pedagogy to create a socially just society. That aim is hugely important and huge in scale and so is beyond the remit of this research which is localised on one specific area: the primary-secondary mathematics transitions for these 192 students in Muscat. The possibilities of future more deeply rooted social change are explored in chapter six.

3.3.2: Freire's ontology: critical hope, love, and respect.

Critical pedagogy frames an understanding of the significance of the teachers' role in a problem-posing model of education which is useful for highlighting the ontology and epistemology at the heart of teachers' transition pedagogy. Teacher support is described as a "crucial element" (Bru et al., 2010: 519) in successful transitions and Freire agrees that the teacher has power within the pedagogy of schools which can be used to either "help or impede students" (2001:68). While changing the pedagogy from a traditional, oppressive pedagogy will not in itself promote social justice, Freire believes that a critical pedagogy can change people; change the ontological and epistemological foundations of schools, how teachers teach and how students learn, and it is this change in people which can drive positive social change.

The teacher's position is key in Freire's problem-posing education, and he argues teachers must not evade their "responsibility, hiding behind lukewarm, cynical shibboleths that justify my inaction because 'there is nothing that can be done.'" (2001:72). This is significant in this study as Freire's critique applies to the seemingly well-intentioned practise of teachers and researchers seeking to support students in their primary-secondary mathematics transition. I present three ontological values which I infer from my reading of Freire's writings, and which ground this thesis and my role in the PAR.

Hope

Education must be for liberation, not domestication, Freire states (1970/1993, 2001) but in these dark pedagogical times where students are locked in an oppressive pedagogy, hope is needed to take up the collective fight towards a brighter, more socially just future.

> Educated hope as a utopian longing becomes all the more urgent given the bleakness of the time (Giroux, 2018:122)

Giroux here draws on Bloch's concept of docta spes or educated hope (Bloch et al., 1986). Bloch's educated hope "arises out of political, rather than epistemological necessity – out of the commitment to the realization of utopia" (Levitas, 1990:24). Freire similarly refers to how a person who is upset by injustice, hurt by discrimination and does not fear what is new is "full of critical hope" (2001:70). Giroux describes his understanding of educated hope as a motivation for social change:

> Educated hope accentuates the ways in which the political can become more pedagogical and the pedagogical more political. (Giroux, 2018:123),

Freire states critical hope is essential for positive social change. This is fuelled by Freire's belief that we have the potential to improve our lives and author our own social

justice. Our conditioning may set us on a path but by becoming critically aware, having critical hope and taking action, we can forge our own paths:

> we are ‘programmed,’ but not *determined*, to be. (Freire, 2019:88)

Freire is unequivocal that hope is essential, not born out of his “stubbornness but out of an existential concrete imperative.” (Freire, 2019:2). For Freire, “hope is an ontological need” (Freire, 2019:2); an “ontological dimension of our human condition” (2001:58) which is central to Freire’s view that education can create the change in people to spark their fight for social justice:

> (w)ithout a minimum of hope, we cannot so much as start the struggle. But without the struggle, hope, as an ontological need, dissipates, loses its bearing, and turns into hopelessness. (Freire, 2019:3)

I find evidence in current transition literature of a paternalistic attitude which negates critical hope. Research findings show how Y6 teachers told "transfer myths" (Chedzoy and Burden, 2005:33) to their students, including warnings of how Y7 has more strict discipline. Over half of the students reported that what their Y6 teachers had told them was inaccurate (Chedzoy and Burden, 2005). The motivation behind these transition myths is not certain but the authors commented that it could either be an attempt to

elicit fear and maintain behaviour in the final stages of primary schooling or an ill-informed attempt to prepare students for secondary school. Since "the majority of primary teachers reported being unfamiliar with the curriculum and teaching approaches" (O'Meara et al., 2020:497) of Y7 and beyond, their advice can be described as ill-informed, as seen in the resulting transfer myths.

I extend this criticism to researchers of existing transition literature. I argue that they demonstrate this paternalistic shibboleth by interpreting the students' responses, filtering their views, and analysing behind closed doors before presenting their findings which will be deposited into students' learning through educational policy and practice. This refusal to share epistemological power evidences the oppressive banking education pedagogy. While there is a wealth of transition literature available, none was found where students had conducted the research as empowered co-researchers. There are examples of research done for students where researchers focused only on teachers' perspectives (Prendergast et al., 2019; O'Meara et al., 2020) or reviews which did not consult students (Bharara, 2020; Van Rens et al., 2018; Grootenboer and Marshman, 2016) and examples of research completed with students as passive participants (Jindal-Snape and Cantali, 2020; Heinsch et al., 2020; Chambers, 2019; Rigby, 2017; Neal et al., 2016) but no examples can be found of transition research with students as active co-researchers, empowered in a praxis of critical pedagogy. Freire shows us that a socially just pedagogy of the oppressed "must be forged *with*, not *for*, the oppressed." (1970/1993, 22) and so, I argue, transition research based on critical hope must seek to explore transitions with students. I adopt Freire's (2001) view that

“the absence of hope is not the ‘normal’ way to be human. It is a distortion.” (2001:69) and seek to ground this PAR in critical hope.

Love

While love may not be all you need, it is, according to Freire, needed:

> “You need to love. You must be convinced that the fundamental effort of education is to help with the liberation of people, never their domestication.” (1970/1993:62)

Freire (2001, 1998, 1970/1993), hooks (2003, 2001), and Darder (2017a, 2017b) agree that love is essential for social justice. Love has transformative and emancipatory power and underpins positive social change. For Freire, “it is impossible to teach without the courage to love” (Freire, 1998:5) and teaching as an act of love has a “revolutionary power” (Darder, 2017a:80), driving us to strive for wider social justice for all.

> It was through such love, he surmised, that teachers could find the strength, faith, and humility to establish solidarity and struggle together to transform the oppressive ideologies and practices of public education. (Darder, 2017a:80)

Freire weaponises love in the fight for justice. For Freire, love is a motivating and energising force; an "'armed love', the fighting love of those convinced of the right and the duty to fight, to denounce, and to announce" (Freire, 2005:74). This love for ourselves, for each other, for our world, demands us to strive for positive change. This love inspires us to rise together, breaking the cycle of oppression:

> the oppressed must not, in seeking to regain their humanity…become in turn oppressors of the oppressors, but rather restorers of the humanity of both (Freire, 1970/1993:18).

Darder similarly states that love can "awaken within us the historical thirst for justice and the political wherewithal to reinvent our world" (2017b:95). Just as Freire's hope is critical, he states our love must also be critical. Love must not be blind to injustice nor "dispense with the political struggle." (Freire, 2001:126). Teachers may be loving to students but not use that love to effect social justice for them. This docile love merely offers comfort in response to injustice while supporting the socially unjust pedagogy.

Love counters the dominant pedagogy which considers the suffering of many as acceptable collateral damage, enabling the ongoing social injustice seen in current the primary-secondary mathematics transitions. A love for others rejects any such oppressive pedagogy since "when love is present the desire to dominate and exercise

power cannot rule the day” (hooks, 2001:98). Such a love will not tolerate any harm nor desires any supersedence.

I find a lack of Freire’s armed fighting love, which I term critical love, in current transitions where teachers and researchers do not use their position as an opportunity to empower students, instead oppressing students by reinforcing the oppressive transition pedagogy. This is evidenced by transition policy focusing predominantly on students’ academic rather than emotional or social needs despite the latter being highlighted as being of greater significance to transitioning students (Jindal-Snape and Cantali, 2020, Van Rens et al., 2018, Bru et al., 2010).

This suggestion is supported by findings suggest that teachers "are less likely to think in terms of developing children's own coping skills, placing control instead within school structures" (Zeedyk et al., 2003:74). This points to teachers relying on school transition policy to guide their support for students rather than, armed with critical love, being driven to empower students in their transitions. The evidence from students with lower social class experiencing more pronounced transition difficulties (TIMSS 2019, 2015; Van Rens et al., 2018) further supports this and shows a lack of critical love which would necessitate fighting for every student.

Respect

A respect for stakeholders and their capacity to author social change is an essential ontological value which underpins Freirean critical pedagogy. Respect for all, for each person's autonomy and dignity, Freire states, is "an ethical imperative" (2001:59). Freire describes how the traditional pedagogy dehumanises all those involved:

> As the oppressors dehumanize others and violate their rights, they themselves also become dehumanized. (1970/1993: 30)

Freire further describes how students are disrespected, cast as "objects, as 'things', hav[ing] no purposes except those their oppressors prescribe for them." (1970/1993: 34). A lack of respect is found where teachers decide what is taught and how and students merely have an "illusion" (Freire, 1970/1993:46) of agency.

The teacher must resolve the teacher-student contradiction "by reconciling the poles of the contradiction so that both are simultaneously teachers *and* students" (Freire, 1970/1993:45). While Freire did not focus his work on schools, his work has been used by others (Cammarota and Fine, 2008, Shor, 1996) in work with students in universities and schools and I extend that here. Freire cautions teachers against a "naivete that will lead me to think that I am equal to my students" (2001:68) and instead states we should use our existing power to support students' developing epistemological curiosity.

Instead, Freire calls for “a commitment on the part of educators and teachers that respects the critical consciousness of the learner, in the knowledge that the ingenuous consciousness of the learner will not be overcome automatically” (2001:36). This present imbalance in power between teachers and students must, therefore, be part of PAR which seeks to be a praxis of critical pedagogy.

There is, I argue, a lack of Freire’s ontological value of respect, which I term here as critical respect, evident for students in the transition literature. Current research shows adult researchers converse with students with a degree of respect, but this is limited to the data collection only, all research design, analysis and implementation is conducted solely by those truly respected, the adults. There is also a significant amount of research (Bharara, 2020; Prendergast et al., 2019; O’Meara et al., 2020; Van Rens et al., 2018; Grootenboer and Marshman, 2016) which positions students as objects and, rather alarmingly, calls for further research of this kind (Prendergast et al., 2019). The existing literature does not represent the respect for students as knowledgeable experts in their lives who can effect social change. Rice et al. (2011) comment on how students’ trust and respect for teachers declines post-transition, with students "at secondary school reported reduced liking of school and reduced trust and respect for teachers" (2011:244). This, I argue, shows an absence of critical respect which is needed to underpin an ontology of Freirean critical pedagogy in transitions.

I argue that the lack of critical respect explains the reported decline in sense of voice (Jindal-Snape and Cantali, 2020; Berson et al., 2019; Groundwater-Smith and Mockler, 2019; Chambers, 2019; Van Rens et al., 2018; Grootenboer and Marshman, 2016; Zeedyk et al., 2003) and confidence (Prendergast et al., 2019; TIMSS 2019, 2015; Van Rens et al., 2018; Attard, 2010; West et al., 2010) following transition. I draw on Shor's (1996) concept of the Siberian syndrome to support my view that this absence of critical respect in pedagogy results in this decline in confidence and sense of having a voice in mathematics post-transition. Shor (1996) describes how students exercise "self-protective negative agency" (1996:14) in response to being pushed away from their learning. I link this "intellectual exile" (Shor, 1996:14) to the lack of critical respect which underscores the sense of exclusion and dismissal students experience, resulting in their decreased positive attitudes.

The disengagement seen in the Siberian syndrome is especially prevalent in mathematics, with a "long-term trend of falling participation" (Brown et al., 2008:4) identified in mathematics. This disengagement in mathematics is important for students' futures and "can limit their capacity to understand life experiences through a mathematical perspective" (Attard, 2010:53). At present, engagement in post-compulsory mathematics learning continues to fall (Brown et al., 2008) and the trend of attitudes declining post-transition (TIMSS 2019, 2015, 2011, 2009). One student showed the depth of the feeling of disengagement when they responded, "If I had to pick any subject, it wouldn't be maths" (Attard, 2013:569), a sentiment amplified by a student who commented on the prospect of choosing to study mathematics; "I hate

maths and I would rather die" (Brown et al., 2008:10). By connecting the reported decline in confidence and voice to Shor's (1996) Siberian syndrome, I argue there is a lack of critical respect in present transition pedagogy.

There is, I argue, an absence of critical hope, love and respect in existing transitions. I next set out my understanding of Freire's concepts of banking education, praxis, conscientization to develop an understanding of critical pedagogy and frame an exploration of the role epistemological curiosity in successful transitions.

3.3.3: Banking education

Critical pedagogy is complex and Freire's explanation of the banking and problem-posing models of education supports my understanding and framing of this theory in the context of PAR within a school. Freire illustrates the social injustice in the traditional pedagogy through his concept of banking education. This is a valuable concept for helping teachers and students to understand the conditions they are presently in. In banking education, knowledge is constructed solely by the powerful elite; the subjects and is deposited into the objects; the passive and oppressed students.

> According to this view, students are "objects" into which teachers pour knowledge, in the first place mathematics and rote science. (Aronowitz, 2001:4)

In such a pedagogy, the powerful minority in society entrench their power through education, perpetuating their dominance by indoctrinating each new generation. By depositing their knowledge into students, they not only ensure their view remains dominant but also suppress students through the process itself, ensuring a passive, obedient workforce conditioned to their chosen ideology. In this oppression, “There is no education here. Only domestication.” (Freire, 2001:57)

In this traditional pedagogy the voices of students are controlled, and agency is minimal. Critical pedagogy seeks to redress this, with ontological values of hope, love and respect for all and an epistemology which empowers students in the development and holding of knowledge about what and how they learn.

Freire’s work with marginalised people is a “refusal of fatalistic quietude” (2001:92) and I apply his ideas to frame research with students who have historically been silenced in education. Students are “under siege” (Giroux, 2018:83) in school, conscripted into an education system underwritten by oppressive pedagogy through their required attendance in schools for most of their formative years. Giroux (2018) describes schools in the USA and, drawing on Freire’s call to “reinvent” (2018:31) Freirean critical pedagogy, I apply this to Oryx, a British curriculum school in Oman. Existing pedagogy in these schools represents a war being waged against these conscripts:

> We have entered a period in which the war against youth, especially poor youth of color, offers no apologies because it is too arrogant and ruthless to imagine any resistance. (Giroux, 2018:104)

Critical pedagogy frames a resistance to this. It is an epistemology which emancipates and empowers those marginalised by traditional pedagogy. The oppressed are valued as experts in their own lives who can develop critical awareness of relevant issues and can co-construct knowledge which results in positive social change to "outmanouver the authoritarianism and the epistemological error of this banking system" (Freire, 2001:32). By extending this to including young students, critical pedagogy frames the development of an alternative empowering epistemology.

Epistemology is understood here as the theory of knowledge which focuses on what is considered "acceptable knowledge" (Bryman, 2016:690). Epistemology is defined by McNiff and Whitehead (2011) as "a theory of knowledge, which involves two parts: a theory of knowledge (what is known); a theory of knowledge acquisition (how it comes to be known)." (2011:23). A person's epistemological stance is "inevitably influenced by your ontological stance" (McNiff and Whitehead, 2011:23) and this is seen in Freire's description of epistemological curiosity which frames this thesis.

Freire describes the importance of a development from "common sense" knowledge to the "higher stage" (2001:36) of critical thinking, which he terms "epistemological

curiosity". (2001:32). For Freire, this epistemological curiosity is essential for the development of a critical pedagogy based on ontological values of hope, love and respect where students and teachers together are empowered to co-construct knowledge:

> the cornerstone of the whole process is human curiosity. Curiosity is what makes me question, know, act, ask again, recognize. (Freire, 2001:81)

Freire describes how epistemological curiosity develops through a "refusal of the 'banking system'" (2001:32) and moves towards the problem-posing education where students and teachers together can "build on our intuitions and submit them to methodical and rigorous analysis so that our curiosity becomes epistemological" (2001:48). This can "set off in the learner an ever-increasing creative curiosity" (2001:32) as students develop from their natural, ingenuous curiosity to the epistemological curiosity.

Epistemological curiosity is, for Freire, a development from an innocent, naïve way of thinking which he terms ingenuous curiosity and which does not have potential for social justice. In much the same way as Freire is quoted as saying pedagogy doesn't change the world but it can change people who can change the world, epistemological curiosity cannot in itself create social change, but it can change the students. These students

may go on to develop conscientization and change pedagogy which is a step towards positively changing the world.

The development of epistemological curiosity is the foundation for building a critical pedagogy as “people cannot raise themselves to bid for power unless their curiosity has been aroused to ask the hard questions” (Aronowitz, 2001:19). Freire asserted that epistemological curiosity will not develop automatically or spontaneously and so one of the “essential tasks of progressive educational praxis is the promotion of a curiosity that is critical, bold, and adventurous.” (2001:38). Therefore, a praxis of critical pedagogy is needed to spark the development of students’ epistemological curiosity.

3.3.4: Praxis

The scale of the challenge to overcome the oppressive, anti-intellectual pedagogy which has permeates every aspect of a student’s educational experience from what they learn to what they sit on presents a “legacy of inequality” (Shor, 1996:17); a sadly non-fictitious oppressive pedagogical beast. Critical pedagogy and Freire’s concept of praxis offers a theoretical grounding for understanding how to slay this beast.

Freire defines praxis as the “reflection and action directed at the structures to be transformed” (1970/1993:99). Aslan-Tutak et al. (2011) expand on this in their exploration of critical pedagogy in mathematics learning, stating praxis “refers to the

steps people take to act on their emerging critical consciousness. With action, people can change practices and systems that routinely disadvantage human beings" (2011:67). Freire sets out the symbiosis of praxis and theory which "mutually illuminate each other." (2013:133) and this connection is described as "the clasped hands of reflection/action and action/practice" (Cammarota and Fine, 2008:62). While praxis "requires theory to illuminate it" (1970/1993:98), theory without praxis is, to Freire, 'blah, blah, blah':

> Critical reflection on practice is a requirement of the relationship between theory and practice. Otherwise theory simply becomes "blah, blah, blah," and practice, pure activism. (Freire, 2001:30)

Critical pedagogy has been criticised for being overly theoretical, "illogical and inconsistent" (Foy, 1971:92) and for being "harmful not just to students but to teachers entrusted with their education" (Stern, 2009: online). hooks accepts this is valid of some critical pedagogy theories "because there is not enough understanding of praxis" (hooks, 1992:146). However, hooks dismisses these criticisms being relevant to Freire, recalling how "again and again Freire has had to remind readers that he never spoke of conscientization as an end itself, but always as it is joined by meaningful praxis." (hooks, 1994:47).

Freire is clear that the oppressors will never relinquish their power, the oppressed must take power for themselves through praxis. The “very obvious truth” (Freire, 1970/1993:156) is that just as the oppressor has a theory to support its power, the oppressive pedagogy which dominates education, so too the oppressed “in order to become free, also need a theory of action.” (Freire, 2013:156). Since the existing banking education “anesthetizes and inhibits creative power” (Freire, 1970/1993:54), an alternative pedagogy is needed. Critical pedagogy posits that problem-posing education which “does not and cannot serve the interest of the oppressor” (Freire, 1970/1993:59) is the solution. Lorde agrees that the oppressor’s system and tools will only serve the interests of the master:

> The master’s tools will never dismantle the master's house. They may allow us temporarily to beat him at his own game, but they will never enable us to bring about genuine change. (Lorde, 2013:27)

Attempts to use the oppressive pedagogy to create social change are rejected by Freire who is clear that such good intentions do not justify harmful means:

> [we] cannot utilize the banking method as an interim measure, justified on the grounds of expediency, with the intention of *later* behaving in a genuinely revolutionary fashion. They must be revolutionary- that is to say, dialogical –from the outset. (Freire, 1970/1993:59)

While I acknowledge that current transition research has not claimed to be a praxis of critical pedagogy I, nevertheless, highlight the lack of praxis found “particularly in mathematics classes” (Kokka, 2020:780) as a weakness since the literature will be, from the theoretical perspective of critical pedagogy, flawed.

Through the praxis of Freirean critical theory, students develop conscientization by asking, examining, and reflecting in an empowered position within the classroom where their voice is valued epistemologically. While Freire states that change must come from the oppressed themselves, he also questions how the powerless can instigate change if they need power to do so:

> if the implementation of a liberating education requires political power and the oppressed have none, how then is it possible to carry out the pedagogy of the oppressed prior to the revolution? (Freire, 1970/1993:28)

Freire describes the vicious cycle which entraps people in the current oppressive pedagogy. Students need power to make changes but the pedagogy of the education system they are in will not grant them any such power. A praxis of critical pedagogy breaks this cycle:

> the oppressed unveil the world of oppression and through the praxis commit themselves to its transformation. (Freire, 1970/1993:28)

Empowered students are positioned alongside teachers, engaged together in a critical dialogue, co-constructing knowledge which explores and resolves issues relevant to social justice. Freire states that “methodological rigour” (2001:51) is essential to establish this critical pedagogy and, I argue this is found in the PAR which will be discussed in the following chapter. For positive social change, people “must acquire a critical awareness of oppression through the praxis of struggle.” (Freire, 1970/1993:25). Praxis is, therefore, a necessary part of the development of a critical pedagogy.

I draw on Freire’s work to argue that we cannot wait for the right conditions to exist before we begin to see positive social change as those who benefit from the existing oppressive system will not relinquish control and initiate change as “the oppressor knows full well that this intervention would not be to his interest.” (Freire, 1970/1993:26). As Lorde (2013) describes, “The master’s tools will never dismantle the master's house.” (2013:27). Instead, Freire argues that “the oppressed must be their own example in the struggle for their redemption” (Freire, 1970/1993:28). Therefore, we must begin to take action and try to make changes in small but significant areas and, as Amsler (2017) argues, “There is nowhere else to start but from here, and no time ever but now” (2017:18).

The teacher and student coming together as co-researchers is a significant step away from the passive positioning of students which is indicative of the banking education. The intertwined teaching and learning of both parties breaks the “vertical patterns characteristic of banking education” (Freire, 1970/1993:53) and develops a solidarity between teacher and students, working together towards a mutually empowering goal. Freire described a solidarity developing between teachers and students as “resist together the obstacles that prevent the flowering of our joy.” (Freire, 2001: 69). Earl observes this development in her research as “the more learning is shared, the stronger solidarity becomes” (2015:17).

From my reading of Freire, I understand that the development from ingenuous curiosity to epistemological curiosity will not happen spontaneously. Action and reflection are needed, and I identify active participation by the students in action and reflection as being an indicator of a praxis of critical pedagogy. This active participation can change the vertical patterns of the teacher-student contradiction with students positioned passively and create the horizontal pattern of problem-posing education where students and teachers together teach and learn, supporting the move from ingenuous to epistemological curiosity. If existing transitions demonstrate the students’ active participation, I argue this indicates that these are a praxis of critical pedagogy which develop epistemological curiosity. I next present my understanding of conscientization and develop the second indicator.

3.3.5: Conscientization

The epistemology of the existing transition approach is examined to determine whether this supports students to develop epistemological curiosity as they co-construct and jointly hold knowledge of issues relevant to them in their primary-secondary mathematics transition.

Conscientization is the key to unlocking an understanding of the situation we are in, the problems we face and the futures we want. Conscientization is a prerequisite for social justice in critical pedagogy. Freire states “conscientization is a requirement of our human condition. It is one of the roads we have to follow” (2001:55). hooks agrees, stating that “to live consciously we have to engage in critical reflection about the world we live in.” (2001:26). A pedagogy must develop students’ epistemological curiosity to empower students as agents who can “think critically and act with authority as independent political agents in the classroom and in larger society.” (Giroux, 2018:158).

If students are critical agents in their transition, there would be evidence within transition literature of students identifying and actioning support for relevant issues. I therefore determine this is the second indicator of whether current transitions support the development of students’ epistemological curiosity.

Freire explains that we should view conscientization “not as a panacea but as an attempt at critical awareness of those obstacles and their raison d'être.” (2001:55). Critical pedagogy creates the conditions for this conscientization, positioning students as experts capable of co-constructing knowledge for their own positive social change. In this amended theory of knowledge acquisition, teachers and students can have critical dialogue where the teacher has a role to facilitate and support students to develop conscientization.

> The more the people unveil this challenging reality which is to be the object of their transforming action, the more critically they enter into reality. (Freire, 1970/1993:27)

In critical dialogue between teachers and students positioned in the more empowered horizontal epistemological position as actively participating co-constructors of knowledge. Together, teachers and students question, reflect and discuss, developing their own and each other’s conscientization. From this, I question whether existing transition research creates opportunities for students’ active participation. Without this, the pedagogy oppresses students and cannot be a site of social justice. In a critical pedagogy, the teacher’s role is to provide the conditions and facilitate conscientization in students, to “encourage human agency, not mold it in the manner of Pygmalion.” (Aronowitz, 2001:10)

As students mature, they become more critically aware and their "increased need for self-determination could lead to a more negative perception of figures of authority, such as parents or teachers" (Bru et al., 2010:521). Shor (1996) similarly describes how students develop this resistance as they grow older:

> students are intellectual and political exiles who grow more cleverly distant and resistant as they age. (Shor, 1996:14)

This occurs at a point in these students' lives when they are developing a critical awareness of the teaching and learning they experience. Grootenboer and Marshman describe how "through their middle school years (Years 5-9) students develop beliefs about mathematics and mathematics education which are substantially influenced by their experiences in mathematics classrooms" (2016:55).

From this reading of critical pedagogy, I understand that if the existing transitions empowered students, their confidence and agentic voices would be evident in the transition literature. This is the third indicator I identify here to frame my exploration of transitions for a praxis of critical pedagogy which develops students' epistemological curiosity.

From my understanding of critical pedagogy, I have developed three indicators which frame my understanding of what epistemological curiosity would look like in transitions. In part II, I next examine transition literature for evidence of these, to indicate whether there is a praxis of critical pedagogy and the development of students' epistemological curiosity in current transitions.

Part II

3.4: Examination of literature for a praxis of critical pedagogy

The three indicators structure the following examining of literature, as I ask:

1. Do students have opportunities for active participation?
2. Can the students identify relevant issues in their transition through action solutions to these?
3. What impact does the transition research/practice have on students' attitudes towards their primary-secondary mathematics transitions?

It is important to note that the existing pedagogy of the primary-secondary mathematics transitions is successful for some students and for others the difficulties can be overcome without lasting damage. Therefore, the limitations I identify relate specifically to those for whom this has a significant, negative impact. The resulting social injustice, I

argue, warrants an alternative approach which can support all students to experience a successful transition.

Do students have opportunities for active participation?

Freire is clear that the oppressed themselves must be actively involved for praxis to be authentic, we "cannot fail to assign the people a fundamental role in the transformation process" (1970/1993:99) and yet there is little evidence of students taking this fundamental role in current transition practice. In this case, evidence of this would be the students actively participating in all stages of the transition research; having meaningful dialogue which involved analysing ideas, creating knowledge of what support they want in their transition and making decisions which will be actioned. Students actively participating in the research including the design, data collection, analysis, implementation, and evaluation stages would evidence epistemological empowerment of students in their transitions. Anything less than this would be what Shor (1996) terms an "epistemic illusion" (1996:11).

From my review of the field of transition literature, I found that while there are examples of some literature working *for* students (Bharara, 2020; Prendergast et al., 2019; O'Meara et al., 2020; Van Rens et al., 2018; Grootenboer and Marshman, 2016) , and some working with students (Jindal-Snape and Cantali, 2020; Heinsch et al., 2020; Chambers, 2019; Rigby, 2017; Neal et al., 2016), there are no reported examples of

transition research or practice *with* students empowered as co-researchers in all stages of the research.

Within the field of transitions, this active participation remains as yet "underexplored as few studies have focused on the perspective of the children." (Van Rens et al., 2018:54). Van Rens et al. go on to conclude that the "absence of any direct consultation with the children involved in the transition process demonstrates the low priority given to this aspect of the transfer" (2018:54) and call for research which focuses on exploring how “children can be partners in the transition process" (2018:43).

Without the students’ actively participating as partners in the transitions, there is no authentic praxis of critical pedagogy. Socially just ends do not, Freire makes clear, justify socially unjust means; we “cannot utilize the banking method as an interim measure” (1970/1993:59). Reviewing the pedagogy of transition research and policy in light of Freire’s concept of praxis highlights that there is not the active participation which evidences the epistemological empowerment needed for an authentic praxis of critical pedagogy.

Can the students identify relevant issues in their transition through action solutions to these?

The failure of existing transitions to empower students to identify and action support for relevant issues is further evidenced in the paternalism I find in transition literature which views students as having limited capacity to co-construct and jointly hold knowledge. Ashton (2008) describes how "children can be an invaluable resource" (2008:176) in improving transitions which mirrors the oppressive pedagogy Freire (1970/1993) condemns where students are considered a resource; an object which may be useful to others. Having concluded that the difficulties in the primary-secondary mathematics transition are persisting, O'Meara et al. (2020) suggest further research is needed to explore the role "teacher knowledge can play in the transition." (2019:16), showing a similar disregard for the possibility of empowering the students at the centre of this experience.

This approach, I argue, is the "epistemic illusion" Shor (1996:11) describes and is in reality banking education pedagogy, which is further oppressing students, compounding their difficulties as they navigate this challenging primary-secondary mathematics transition. The students have no opportunity to explore what issues are relevant to them, developing epistemological curiosity about their transitions. Instead, students are positioned as passive objects. My view is supported by Jindal-Snape and Cantali (2020) who comment on how this approach in existing transitions negatively impacts on students' development of agency:

> This, however, diminishes the role and agency of the child actively developing, and tapping into, their own support systems. (2020:1258)

My claim that there is a lack of epistemological curiosity in present transitions is supported by recent calls for the development of students' role in these transitions. Chambers (2019) asks "who better to give insight into the experience of transition and its impact on their motivation, than the end-users and key-stakeholders...the students themselves?" (2019:222). Despite this, Chambers' research is, I argue, an example of the students' role being limited to that of passive object, with the methodology reporting how adult researchers alone designed the research, analysed the data and determined the outcomes to be actioned. While students did participate, it was limited to a passive role. This was far removed from epistemologically empowering students to identify and action issues which is required for an authentic praxis of critical pedagogy.

Others in the field have called for further research which would, I argue, further oppress students. Rice et al. (2011) state "research is not consistent" (2011:246) and call for more quantitative research. West et al. (2010) similarly critique the field of transition literature as being inconsistent due to "the lack of longitudinal studies" (2010:47). I disagree fundamentally with this call for more quantitative research and argue inconsistencies are not a weakness of the findings but reflect the uniquely subjective nature of students' transition experiences. This emphasis on the utilitarian function of

students' responses to what is well established as a challenging personal experience demonstrates a lack of care for these students and a disdain for the value of their diverse experiences; they only have worth if they correlate with a statistically significant number of other students. This, I argue, demonstrates the lack of epistemological empowerment in existing transitions where students are not seen as capable of creating and controlling valid knowledge.

Prendergast et al. (2019) state most existing research is "based on the experiences of students making the transition" (2019:246) and call for more research needed with teachers who they state are the "other main stakeholders" (2019:246). I reject this conclusion that students dominate current research as an "epistemic illusion" (Shor, 1996:11). The students have not been empowered to select research methods which would enable them to capture their truth, to have an empowering, respectful, and meaningful dialogue about what would support them and for their views to be truly listened to, heard and actioned. Prendergast et al.'s (2019) conclusion that the current field of transition literature dominated by students is, in my opinion, myopic. Situating a review of literature within critical pedagogy reveals the absence of students being epistemologically empowered and cries out for more, not less, empowerment of students to develop epistemological curiosity in their transitions.

There are examples from other fields of educational research with young students which demonstrate a developing view that students can and should be epistemologically

empowered in transition research and practise. The Collective of Researchers on Educational Disappointment and Desire (CREDD) was established in 2006 in New York city, USA as a space for what is termed youth participatory action research (YPAR). The authors detail how the YPAR was conducted with young people aged 16-22 years old to explore school policies and practices which they were disappointed with. However, I found no examples of research specifically relating to transition. They actively participated in all stages of research from co-constructing research questions to collective analysis and report that this resulted in “breaking silences and reclaiming spaces” (Tuck et al., 2008:51) that have been traditionally used against these young people.

The rights of young people are enshrined in international law through the United Nations Convention of the Rights of the Child (1989), with Article 12 conferring the right for a child to express their views freely in all matters affecting them and for their views to being given due weight and article 13 giving children the right to freedom of expression. Despite these rights “student consultation and research activities are often little more than tokenistic interventions serving established power’” (Groundwater-Smith and Mockler, 2019:29). This is seen in the discussion of Fabian and Huber who set out their position as “abandoning paternalistic practice” (2019:156) and seeking to remove the normative gaze from above found in much research with children.

What impact does the transition research/practice have on students' attitudes towards their primary-secondary mathematics transitions?

Viewing existing transition literature through the lens of critical pedagogy highlights the impact of not epistemologically empowering students. The effect of this, I argue, is the reported decline in students' sense of voice and confidence following their transition to secondary school. I draw a connection between this decline and the lack of praxis of critical pedagogy to conclude that current transitions are flawed, and an alternative pedagogical approach is needed.

The earlier review showed that while there are many examples of transition research including students responding to questions and surveys, their role in research is that of a passive object in the banking education and their voice is not truly heard. This view is supported by Grootenboer and Marshman (2016) who found that in current transitions "very little has included the voices of school students" (2016:35). In their recent review of transition literature, Van Rens et al. (2018) found that while there is evidence of students being asked their opinion by researchers who use this as the basis of their recommendations, there was no active participation by students working alongside researchers in a more epistemologically empowered partnership:

> Unfortunately, we found little evidence of educational partnership or cooperation between these stakeholders (2018:54)

This conclusion is echoed by many others, including the earlier review of transition literature by McGee et al. (2003) which found students are "under-represented both in the decision making and in the interventions" (2018:55). This pattern of inactive participation includes mathematics transitions specifically, as Attard (2010) identified:

> Another gap seems to be a lack of ‘student voice’ exploring students’ perspectives on mathematics teaching and learning during this time of transition (2010:55)

The students’ decline in sense of voice and confidence is linked, I argue, to the failure of existing transitions to empower students to actively participate and identify and action support for relevant issues. The importance of relationships with students and teachers is seen as being a priority to students (Jindal-Snape and Cantali, 2020; Topping, 2011; Ashton, 2008; Evangelou et al., 2008; McGee et al., 2003) but this is not reflected as a priority in transition research or policy where the focus is on academic issues. This results in a "major difference" (Topping, 2011:280) between what students are concerned about and need support with and what teachers focus on. There is a need for increased "awareness by teachers also of the importance of social relations in the lives of these young people" since "making new friends appears to be at least as important to them as their academic development" (Anderson et al., 2000:34). Literature confirms that "enabling relationships are fundamental to the process of learning"

(Tobbell and O”Donnell, 2013:11) and that “positive relationships can ease the challenges of transition” (Van Rens et al., 2018:45).

This has been shown to be particularly important in mathematics learning since “relationships with teachers have a substantial impact on student learning in mathematics in addition to relationships with peers." (Attard, 2010:54). Yet present literature shows that research and schools have focused more on the academic dip in transition (Jindal-Snape and Cantali, 2020; Van Rens et al., 2018; Coffey, 2013; Topping, 2011; Ashton, 2008; McGee et al., 2003).

This results in a challenging transition for many students whose concerns and fears are not being recognised and supported. Since they are excluded from any meaningful role in their own transitions, students are barred from developing the knowledge and skills needed to support any difficulties they encounter and, understandably feel a decreased sense of voice and lose confidence in themselves and their learning. Zeedyk et al. (2003) commented how they observed a "mismatch between children's fears and the repertoire of skills on which they can draw to address those fears." (2003:74). This, I argue, is because they are restricted from active participation in identifying and actioning support needed in the transition process which is required for an authentic praxis.

Freire tells us that “when a word is deprived of its dimension of action, reflection automatically suffers as well” (1970/1993:60). Instead of the students’ responses being a source of social change, they have no transformative power. Developing critical awareness of their learning and transition needs through active participation in a praxis of critical pedagogy would address this as students would develop skills to understand and address their needs rather than being left with a feeling of confusion and anxiety.

A student’s confidence is entangled both with their mathematics transitions and their attainment in mathematics. Data from TIMSS (2019, 2015) longitudinal studies shows that successful transitions are linked to confidence and, conversely, that a difficult transition is linked to a decline in confidence. The TIMSS report (2015) states that there is a clear correlation between mathematics confidence levels and mathematics attainment. The difference between the most and least confident students in mathematics correlated with a gap of up to one year in attainment:

> greater mathematics anxiety is associated with a decline in performance of 34 score points – the equivalent of almost one year of school. (2015:64)

Transition literature (Van Rens et al., 2018; Paul, 2014, Attard, 2010; Bru et al., 2010; Evangelou et al., 2008; McGee et al., 2003) confirms this link between the decline in confidence being pronounced “particularly in the area of mathematics education” (Attard, 2010:53). In the most recent TIMSS (2019) report, the authors reiterate the

reported trend of confidence being linked to mathematics learning and that students' confidence declines post-transition. They recommend that all "school leaders should ensure that all staff, including non-teaching staff, encourage and model motivation, confidence and enjoyment in maths for all children." Zeedyk et al. (2003) found that teachers place control "within school structures" (2003:74) and Chambers (2019) observes that "most studies on transition reflect schools' policy and teachers' practice" (2019:222). This shows that school policy is being relied upon to determine transition practice rather than empowering stakeholders to self-determine what transition practice they want and need; this depositing of knowledge from above through policy is banking education.

I draw a connection between the convergence of students' experience of challenges during their transition to secondary and their developing critical awareness with their decline in confidence. My reading of critical pedagogy frames my understanding that this is caused by the passive participation and lack of empowerment to identify relevant issues and action solutions. The students critique their teachers' support or lack thereof and become more aware that it is not supporting them. As a result, students lose confidence that they will be able to succeed in mathematics learning.

The decline in confidence and sense of voice in mathematics correlating with the period of transition shows that this goes deeper than rebellious teenagers. It has been established that the declines in attitude and attainment are directly linked to the

transition itself (Van Rens et al., 2018; West et al., 2010). Students' previous experience of education is primary schools which have a much more holistic approach to teaching with students spending each year within one discreet cohort with one class teacher. The shift to secondary represents considerable pedagogical changes (Paul, 2014) and I have summarised research findings to show that while some students adjust to these changes reasonably well, this represents a challenge for every student (West et al., 2010) and for many, this creates considerable and long-lasting difficulties.

I argue that this convergence of the challenging transition and students' developing critical awareness this sparks students' critical awareness that their school and teachers are not designed to support them. This is a nascence of epistemological curiosity, an initial spark of critical awareness which, if transitions were a praxis of critical pedagogy, could become a crucible of conscientization and lead to greater social change.

3.5: Conclusion on the role of epistemological curiosity in existing transitions

At the heart of these transitions, I find the oppressive pedagogy of Freire's banking education. Freire's critical pedagogy gives a theoretical framework to my review of existing transitions, highlighting the limitations, and shaping the alternative approach I explore here in this PAR. I have set out that if transitions are to be grounded in the socially just critical pedagogy which can empower all students and resolve the reported ongoing social inequalities, there needs to be a praxis of critical pedagogy which empowers students to develop their epistemological curiosity. From my reading of critical pedagogy, I have identified three indicators to guide my review of transitions. I

have found, however, that these key elements of a praxis of critical pedagogy; students' active participation, identification of and actioning support for relevant issues, and a positive impact on their confidence and voice, are all lacking in existing transitions.

While much of the literature (Jindal-Snape and Cantali, 2020; Chambers, 2019; Van Rens et al., 2018; Neal et al., 2016; Attard, 2010; West et al., 2010; McGee et al., 2003; Zeedyk et al., 2003) sought to amplify student voices, it was conducted by adult researchers, resulting in students having only limited and non-agentic voice with no active participation in the research of their transitions. I connect this to students' declining confidence; they experience a difficult time and realise that their teachers are not giving them the support they need but are instead focused more on academic attainment.

I, therefore, answer the second research question, concluding that existing research and literature on primary-secondary mathematics transition does not consider the idea of epistemological curiosity, and the role it plays in transition. This supports this exploration of student led PAR as a praxis of critical pedagogy to develop students' epistemological curiosity, empowering them in their primary-secondary mathematics transition.

Chapter 4. Bringing Critical Pedagogy, Participatory Action Research and Living Theory Together.

4.1: Introduction

This chapter summarises PAR as a research approach before presenting a significant limitation which is relevant for the PAR findings here to action social change. I set out PAR in the context of mathematics transitions, drawing on critical pedagogy to understand the connections between this research approach and the theoretical framework of this study before describing the specifics of this PAR. I then discuss how a living theory methodology can address the limitation I identify, creating a methodology which strengthen the students' findings from their PAR being able to action positive social change in their primary-secondary mathematics transitions. This addresses the third research question, in what ways can Participatory Action Research, combined with living theory, support students to understand the primary-secondary mathematics transition, and to experience it more positively?

4.2: Participatory action research

PAR is a branch of action research (AR), a "proper subset of AR" (Udas, 1998:602) which seeks to challenge existing wisdom and address questions which are of significance to those who are traditionally disenfranchised by research. It is a force for social justice, with "all members functioning as equals" (Udas, 1998:604), empowered through the process of research itself, as well as the research outcomes. PAR comprises iterative cycles of action and reflection repeated by the participant

researchers as they develop their understanding of the research questions which sparked the research exploration.

In the 1940's, Lewin described the potential of AR to redress the many significant social injustices at the time and called on social scientists to have courage to engage in AR. He referred to "courage as Plato defines it" (Lewin, 1946:46). In Laches, Plato recounts how Socrates and two generals Laches and Nicias debate knowledge and courage:

> Socrates: And courage, my friend, is, as you, say, a knowledge of the fearful and the hopeful? (Plato, Laches:199)

Some 80 years after Lewin called for courage, I argue that teachers need to have courage to engage with students and overcome the fear that comes with sharing power over knowledge construction and embrace the hope that this co-constructed knowledge will improve teaching and learning for teachers and students alike.

PAR, I argue, can answer this call for courage. PAR is related to AR but may be viewed as the more rebellious member of the family. PAR "challenges the traditional research hierarchies" (Fenge, 2010: 880) and "rejects science as the dominating knowledge" (Swantz, 2008: 38) and instead seeks to disseminate power over knowledge creation in research. PAR has an emphasis on the participation of those involved in the research on the knowledge created by the research.

> Its central tenet was that if development was for the people, then as primary stakeholders in the development processes, people themselves should represent their case in the stage of knowledge generation as well as of its use. (Pant, 2014:584)

An important distinction must be made between PAR and other participatory and action research approaches to clarify the focus of this study. Figure 1 illustrates that there are three distinct approaches: participative research, participative action, and action research and then the fourth approach of PAR which sits at the intersection, encompassing these three approaches.

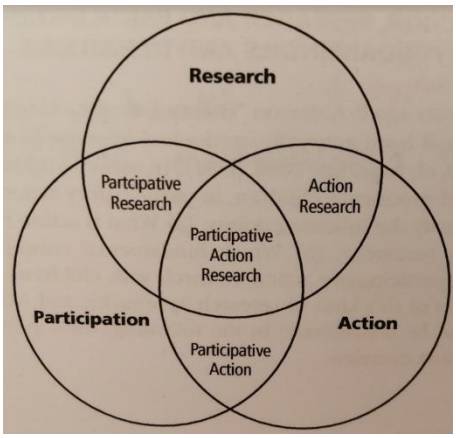


Figure 1: The relationship between participation, action, and research.

(Berson et al., 2019: 154)

PAR has at its heart, a social justice agenda. PAR is “democratic, equitable, liberating and life-enhancing qualitative inquiry” (MacDonald, 2012:34). Knowledge is not created

with the intent of contributing to “the theoretical corpus of the social sciences” (Pant, 2014). Rather, PAR seeks to redress the imbalances in power of knowledge creation, empowering stakeholders to participate in research and generate knowledge which can support positive social changes for themselves.

PAR is multidisciplinary and its roots are organic; its development cannot be traced to one source but instead it has developed in different locations over time as a response to the injustices of various marginalised people.

> As with all great things, it had no single inventor…it was the result of an atmosphere rarefied by the clash between clear-cut scientific explanations and a rough reality. (Molano, quoted by Swantz, 2008:31)

The core principles of PAR could be summarised as being empowered participation, commitment to social change and collaborative and equitable research (Pant, 2014:584-5). Like action research, PAR defies neat definitions as it is an evolving research paradigm but could be described as “a philosophical approach to research that recognizes the need for persons being studied to participate in the design and conduct of all phases.” (Vollman et al., 2004:129). The definition of PAR which I adopt here is:

> a group of activities whereby individuals with differing power, status, and influence, collaborate in relation to a thematic concern. (McTaggart, 1991:38)

In PAR, the participants of the research are valued as the experts, the “real knowers” (McIntyre, 2008:11) in their lives who are the researchers rather than the research subjects. The research is structured so that the participants are empowered and respected to create knowledge themselves, answering the questions pertinent to them and creating and actions and solutions to their own issues. PAR’s “collective inquiry builds ownership of information” (MacDonald, 2012:40) whereby participants create knowledge which enables them to question and create improvements to their own contexts.

There is “no one overriding theoretical framework that underpins PAR” (McIntyre, 2008:3) but critical pedagogy is cited as being of significance in its development and Freire is described as a “major influence in the field of PAR” (McIntyre, 2008:3). Freire conducted PAR in his early research to develop “counterhegemonic approaches to knowledge construction within oppressed communities” (McIntyre, 2008:3). This grounds my understanding of the power of PAR to effect positive social change.

PAR is a vital approach for supporting students to have the epistemological curiosity Freire argued is necessary for social change. Freire’s conscientization or “critical consciousness development requires the individual to be knowledgeable about political, social, and economic contradictions, and to take action to change the oppressive elements of reality” (MacDonald, 2012:37); PAR enables students to do so. PAR develops students’ agency to enter into a critical dialogue regarding issues around their

learning, to create knowledge which represents them, and be empowered to take action they decide will create social change for themselves. This sparks epistemological curiosity which can develop into conscientization.

As such, PAR represents a shift in paradigm of knowledge creation which develops the critical consciousness Freire argued was central to resolving the contradictions inherent in a repressive pedagogy. This creates a powerful connection between the PAR approach and the theoretical framework of this study and its aim of empowering students to create their own supported mathematics transitions.

4.3: Critiques of PAR

PAR has been criticised for being a “soft” (Duncan-Andrdae and Morrell, 2008:109) form of research which is variously labelled as “weak” (Adelman, 1993:21), “biased…(and) unsound” (Duncan-Andrdae and Morrell, 2008:109) and consequently PAR “tends to be scorned” (McNiff and Whitehead, 2011:34).

Traditionally, “objective knowledge is generally held as the dominant form by the scientific community.” (McNiff and Whitehead, 2011:33) and the knowledge created in PAR is of a highly subjective nature. This is not, I argue, a flaw of PAR but rather a central tenet which enables PAR to be a praxis of positive change and so this should not be diluted but, rather, protected. This does, however, present some challenges

which can be addressed through the development of a methodology to underpin PAR in this study.

4.4: A participatory action research approach to transitions

Pant (2014) stated that “PAR should be used for conscientization” (2014:587) and this is at the heart of the decision to use PAR in this study. If students can engage with PAR, I believe they can critically examine their mathematics transition and create solutions to affect a positive transition experience which will support their mathematics learning in secondary school.

In the previous chapter, I noted how Freire asks in Pedagogy of the Oppressed:

> But if the implantation of a liberating education requires political power and the oppressed have none, how then is it possible to carry out the pedagogy of the oppressed prior to the revolution? (1970/1993:28)

I posit that the use of PAR in this study can create the empowerment needed for students to critically examine the pedagogy underpinning their mathematics transitions and amend this to reflect what they need as individuals. By assuming the role of researchers, students are breaking the “vertical patterns characteristic of banking education” (Freire, 1970/1993:53) and establishing a dialogue between teacher-students and student-teachers where knowledge is jointly constructed and owned. PAR

“is a form of empowering critical pedagogy” (Duncan-Andrade and Morrell, 2008:129) which can evolve students from being passive knowledge consumers into empowered knowledge producers who author their own positive social change.

In their PAR with high school students in California, USA, Duncan-Andrade and Morrell (2008) concluded that PAR was an act of critical pedagogy which effected positive change though “creating contexts that allow for a critical pedagogy of youth participatory action research” Duncan-Andrade and Morrell, 2008:129. Udas (1998) agreed that PAR can provide “a foundation for the development of critical pedagogy” (1998:599). Udas (1998) extols the value of PAR for developing a critical pedagogy in schools, claiming educators who value their students have “an obligation to at least entertain the potential benefits and implications of participatory action research as critical pedagogy.” (1998:623).

A Higher Education study from Spain (Fernandez-Aballi et al., 2015) gives an insight into PAR as a way to develop a Freirean critical pedagogy which is inspiring for this study. The authors concluded that PAR with Higher Education students situated within critical pedagogy could redefine the curriculum. This study seeks to apply this “PAR-based Freirean critical pedagogy” (Fernandez-Aballi et al., 2015:19) in the context of a school in Muscat, Oman to explore if a praxis of critical pedagogy can be developed through student PAR to explore the primary-secondary mathematics transitions.

Rather than a researcher conducting research on research subjects, in PAR the researcher and research subjects are co-researchers, conducting the cycles of AR together. The co-researchers conduct research as a “collective” (Cammarota and Fine, 2008:6), collaboratively designing research questions, selecting methods, collecting data and discussing the findings. In PAR the participants typically comprise a lead researcher who has training and experience of research working alongside stakeholders who are novice researchers. All participants work together as co-researchers to “share their knowledge as equals” (Swantz, 2008: 38) and have a shared role in collaboratively creating knowledge. This echoes Freire’s description of the significance of teachers and students co-constructing knowledge together:

> The important thing is for both teacher and students to assume their epistemological curiosity. (Freire, 2001:81).

In the PAR of this study, I take the role of lead researcher, researching alongside the student participants and facilitating the research. This is set out in more detail in the following Methods Chapter. It is appropriate for the lead researcher to take responsibility for the ‘nuts and bolts’ of research protocols (Jolicoeur et al., 2019) including setting and monitoring deadlines, establishing confidentiality, and securing consent since the participant co-researchers may not have the prerequisite knowledge of this is they are novice researchers.

This is in line with Freire's description of how in a critical pedagogy dialogue "does not diminish the need for explanation and exposition whereby the teacher sets forth his/her knowledge." (Freire, 2001:81). What is key to Freire's critical pedagogy, and is established by PAR here, is a dialogue where both teacher and students are learning from each other and "become jointly responsible for a process in which all grow" (Freire, 1970/1993:53). This joint, respectful, loving dialogue is at the heart of my own ontological stance.

While the participant researchers may not have experience of research, they are viewed as experts in PAR and their perspectives shape the research from the "ground up" (Fenge, 2010: 880). In PAR, the participant researchers are stakeholders in the issues being explored. The PAR empowers the stakeholders to explore issues relevant to them without "manipulation from the researcher" (MacDonald, 2012:34) to author social change which is relevant to them.

The lead researcher is an active agent and facilitator in the research but must remain reflexive to ensure authentic participation. In this PAR, my role is to facilitate deadlines, share skills and resources with the students and communicate the students' findings with other teachers but all decisions are made by the students. This is in keeping with Udas's (1998) and McTaggart's (1991) description where a researcher must not view themselves "as an expert, but instead as a learner" (Udas, 1998:602) to facilitate authentic participation whereby participants "set the agenda of the inquiry, participate in

the collection and analysis of data, and have control over the outcomes of the research" (McTaggart, 1991).

This is a shift away from existing transition research (Jindal-Snape and Cantali, 2020; O'Meara et al, 2020; Prendergast et al., 2019; TIMSS 2019, 2015; Van Rens et al., 2018; Grootenboer and Marshman, 2016; Attard, 2010; West et al., 2010) which I concluded positions students as a research object with their voice filtered by the adult researchers. The existing transition literature and its "normative gaze 'from above' contradicts the empowerment approach" (Fabian and Huber, 2019:156) of PAR. While other research has been conducted with well-intentioned means of supporting students in the challenging transition, this paternalistic approach has failed to improve transitions which continue to be problematic (Hutchinson et al., 2018).

A key feature which is present in all PAR is the iterative, "braided process of exploration, reflection, and action" (McIntyre, 2008:5). All AR including PAR follows a reflexive, iterative process of "questioning, reflective, dialoguing, and decision making (which) resists linearity" (McIntyre, 2008:6). This mirrors Freire's description of praxis as "reflection and action directed at the structures to be transformed" (Freire, 1970/1993:99). PAR can, therefore, be viewed as praxis, as critical pedagogy in action.

The issues to be explored in this iterative cycle of action and reflection of PAR are determined by the participants and the stages of questioning, reflecting, and actioning are conducted by them acting as empowered researchers to construct knowledge in

response to their inquiry. There are various models for the iterative cycles of action research which underpin PAR (McIntyre, 2008) and the one selected here for its clarity and established practise is McNiff and Whitehead's (2011) action-reflection cycle (Figure 2). McNiff and Whitehead's (2011) action-reflection cycle sets out the five stages of AR as observe, reflect, act, evaluate and modify. They explain that this iterative process "is ongoing because as soon as we reach a provisional point where we feel things are satisfactory, that point itself raises new questions and it is time to begin again." (2011:10). This gives a valuable structure to novice researchers undertaking PAR as is the case in this study.

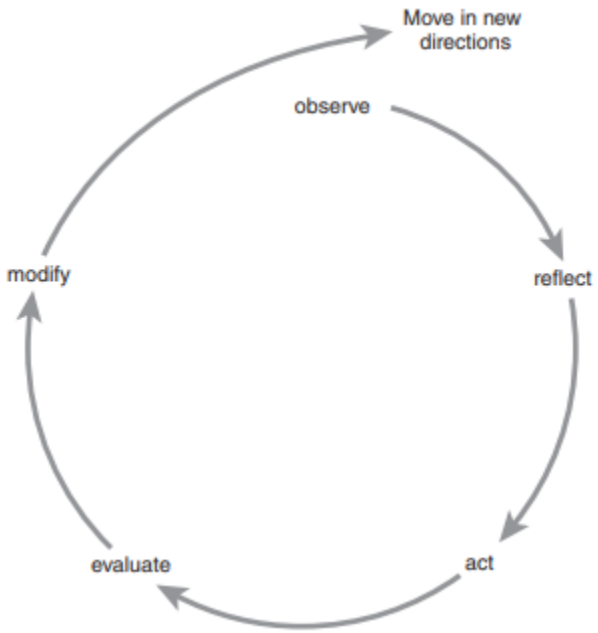


Figure 2: Action-reflection cycle (McNiff and Whitehead, 2011:9)

4.5: Specifics of the PAR

The action-reflection cycle is applied here to two iterations of PAR over the course of two academic years with me acting as the lead researcher alongside the Y6 student participants. Together we can use the five stages of observe, reflect, act, evaluate and modify to explore how we can create successful mathematics transitions to Y7. This is described in detail in the following methods section.

PAR has been shown here to be an appropriate methodological choice for this study due to its connections to the theoretical framework underpinning the social justice aim of this study to empower students through developing a critical pedagogy of mathematics transitions. There are, however, some criticisms of PAR which need to be addressed to ensure the students' PAR can effect social change in constructing their own positive mathematics transitions.

There is currently a "tension" (Fabian and Huber in Berson et al., 2019:154) within PAR between balancing the aim of empowered participation of often novice researchers with creating research which, while honouring the subjective nature of the participants, can also be used to action social change. For findings to be actionable, they must be robust and, currently, this is an area in need of improvement in PAR:

> Participatory research needs to reconcile questions of rigour and professionalism with the idea of sharing power and competencies (Fabian and Huber, 2019:154)

These criticisms reflect the Aristotelian view dominant in Western cultures were people "understand knowledge as an empirical object of rational enquiry" (McNiff and Whitehead, 2011). Knowledge is a "commodity" (McNiff and Whitehead, 2011:33), created and owned by those with power who dictate what is considered correct knowledge and then deposit it into the other less powerful members of their society. This creates a vicious cycle where "the person with the most knowledge has the most power" (McNiff and Whitehead, 2011:33). Only those with power can create valid knowledge so the power imbalance is maintained, embedding social injustice.

Challenging this view of valid knowledge has proven difficult since PAR does not typically produce the empirical evidence (McNiff and Whitehead, 2011) which is considered necessary to validate knowledge.

> the methods for testing objective claims to knowledge are held by those research communities as the only legitimate forms so, until recently these forms have been applied to subjective forms to knowledge (McNiff and Whitehead, 2011:33).

Since PAR's main aim is to improve the lives of the participants through empowering them in knowledge creation, it must remain focused on honouring this subjective knowledge as the truth without seeking external validation. There is a disconnect in applying a set of rules for objective knowledge to subjective experiences which, I argue, results in the views of students being distorted or dismissed. This is supported by the

earlier review of transition literature where students were a source of data only and were excluded from the other stages of research such as reflection, action, and evaluation. The adult researchers acted alone in constructing knowledge from the students' subjective responses. The researchers applied objective criteria to validate the students' subjective experiences, seeking to find themes shared by a high proportion of the students to determine which areas warranted action and which could be dismissed as insignificant. This dominance in knowledge creation by the researchers distorts the truth of the students' unique transition experiences and further embeds their passive role in the pedagogy of their transitions.

This is evidenced by the conclusion in Zeedyk et al. (2003) when the authors highlighted the disagreement between students' and parents' views regarding the students' transition, advising that "pupils' anxiety needs to be taken seriously" (2003:77). The authors could see that the research was not addressing students' needs and, I argue this is due to the methodology of the research. In the non-participatory approach of current transition research students' responses are filtered through the objective, paternalistic lens of the researchers who alone are considered capable of validating the responses and creating knowledge.

It is clear from those who have taken part in PAR that the lack of empirical evidence, "does not invalidate the experience" (McNiff and Whitehead, 2011:33). I apply Chaudhary's statement relating to participatory research (PR) to the PAR of this study:

> PR should stop seeking validation from the frame of reference of dominant modes of knowledge production. Instead, it needs to seek validation from the tenets of its own epistemology (1997:124)

Therefore, PAR should not attempt to tick the standards set by other research types but assert its own standards of validity which can ensure its research is reliable and can be actioned while respecting the epistemology of the knowledge ownership which is central to PAR. To assert this, PAR requires a methodology which underpins the epistemology of knowledge being created and owned by the research participants.

This need for a methodological basis for PAR which can support the subjective creation of knowledge also extends to theory. Currently, AR is “rarely cited in conversations about educational policy” (Duncan-Andrade and Morrell, 2008:109) and this undermines the actioning of PAR’s findings into educational policy and practice which is essential to affect the hoped-for social change.

Whitehead (2019) describes how small-scale practitioner research is frequently dismissed as being incapable of influencing educational theory since the findings “are at best just stories, they’re just anecdotes. They have absolutely no objectivity because they are just grounded in your own subjective understandings.”. Theory within PAR is “seldom raised (and)…seem(s) to be of low priority” (McNiff and Whitehead, 2011:1).

This has resulted in a situation where PAR's subjective claim to knowledge "still tends to be scorned" (McNiff and Whitehead, 2011:34).

PAR embraces the unknown with a reflective design and the outcome will and should be subjective so it is relevant to the stakeholders but it should also be valid so it can be actioned in society to effect its potential social change. While the aim is not to make it easily digestible, it should have a standard of rigour to ensure the findings are what will support the participants. Otherwise, the core aim of creating social change will not be met and the time and energy spent in the PAR was fruitless. The "cross-fertilization of research traditions that characterize PAR" (McIntyre, 2008:4) has resulted in a lack of clarity of the methodological grounding for PAR. PAR is not a methodology but rather a "research strategy" (Fabian and Huber, 2019:154) or an "orientation to inquiry" (Reason and Bradbury, 2008:1) and so is in need of a methodology to underpin it and support its findings being held as valid theory and be actioned.

PAR appears to have hit a glass ceiling in educational theory; it is accepted that PAR has much to offer to the development of practice but, as yet it is not as accepted that PAR can contribute to theory:

> practitioner research is generally held in high regard for its contributions to quality practice, it is not yet held in equal regard for its potential contributions to quality theory. (McNiff and Whitehead, 2011:1).

It is necessary to break through this glass ceiling if the stakeholders in PAR are to contribute to the development of theory as well as practice. Without the student participants contributing to educational theory, there cannot be a praxis of critical pedagogy which I have argued is essential to overcome the current social injustices inherent in the mathematics transitions. Therefore, for the PAR to be able to contribute to theory and create a critical pedagogy, the methodology underpinning this research must be clearly set out.

4.6: Living theory: a methodology for PAR

As discussed earlier, the "cross-fertilization of research traditions that characterize PAR" (McIntyre, 2008:4) and "low priority" (McNiff and Whitehead, 2011:1) of theory within existing PAR has led to the criticisms of PAR as being a biased and unsound research approach. These criticisms of PAR have resulted in the widespread dismissal of its findings within social sciences where PAR "still tends to be scorned" (McNiff and Whitehead, 2011:34) and is not considered to be capable of contributing to theory. The significance of this is that the participants' findings which intend to improve their lives, may easily be dismissed by those whose power they could disrupt. This creates a need to secure a methodological basis for the PAR in this study, a need which is "urgent, in spite of its complexities" (Chaudhary, 1997:124).

Therefore, the PAR in this study needs a methodology which ensures the research can contribute to theory without dishonouring the principles at the core of this praxis to

create a critical pedagogy. This can be achieved, I argue, through the application of living theory to develop a methodology for PAR in this study.

Living theory challenges the “normative understandings of how contributions to educational theory should be judged” (McNiff and Whitehead, 2011:5) and, as a methodology, can be used to counter the criticism that PAR cannot contribute to educational theory. This is powerful for this PAR situated within the existing pedagogy of schools where educational theory is constructed and controlled according to these normative understandings. Living theory enables those engaged in PAR to contribute to educational theory by redefining what theory is and how it is created. Living theory or living educational theory as it sometimes also known, is an alternative to the dominant view in current social science research regarding what constitutes theory and how theory is formed in research. Living theory is rooted in an epistemological view that knowledge and theory can be created by everyone throughout their daily life (Whitehead, 2019). McNiff and Whitehead (2011) describe how they view living theory as seeing the potential in a reflection of our own values to develop the flourishing of humanity. This echoes Freire’s call for a pedagogy of the oppressed which supports human flourishing and mirrors both Freirean and my own epistemological position.

The critical pedagogy theoretical framework of this study highlights the social injustice of knowledge being held by a powerful elite and used to subjugate others and, similarly, living theory is concerned with “how theory is used to maintain the current epistemological hegemony of the social sciences (McNiff and Whitehead, 2011:46).

Living theory is so called because of its organic nature:

> It is living because, as people engage in understanding I, they learn more and their theory changes as they understand more. Further, because they are living what they learn, new knowledge emerged (Whitehead, 2000:92)

McNiff and Whitehead (2011) equate claims to theory with claims to knowledge, explaining that “all theories can be understood as knowledge claims” (McNiff and Whitehead, 2011:29). Theory generation, they argue has become political as people use this to increase their power. The result is a current epistemological hegemony within social science whereby only certain people hold power to determine what is theory and, therefore, what is knowledge. Currently, objective quantitatively generated knowledge has a monopoly and is held “as the dominant form by the scientific community” (McNiff and Whitehead, 2011:33).

Living theory disrupts this imbalance in power by supporting the creation of theory and knowledge by action researchers who are not part of the existing traditional research body. I interpret this to include the PAR of this study which seeks to empower students to create theory and knowledge surrounding their mathematics transitions. Udas’s view that “participatory action research is grounded in theory and practice directly related to the participants” (1998:607) supports my interpretation. Situating this PAR within a living theory methodology enables the students’ findings to be held up as contributing to

quality theory which can be relied upon and actioned through mathematics transition policy and practice to support their mathematics transitions. As such, I posit PAR within a living theory methodology can be a praxis for social justice.

Whitehead (2019) explains how he approaches developing his own living theory through everyday observations, questions, reflections, and evaluations which centre on the key question; how can I improve what I am doing? This creates knowledge and theory of his own lived practice. This view of knowledge being constructed by the participants of the research mirrors the aims of this PAR situated within a critical pedagogy framework where knowledge is constructed by the students as they critically engage with relevant issues, become aware of their needs and create solutions to address this through the PAR. Living theory extends this by explaining that this knowledge can be viewed as valid educational theory which can be used as a foundation for pedagogical policy and practice. I have adapted this as the core question for the PAR in this study; how can we create successful mathematics transitions to year 7?

McNiff and Whitehead's (2011) model of action-reflection cycle (Figure 2) gives a structure to support the exploration of this key question. The five stages of observation, reflection, action, evaluation, and modification enable flexibility for participants to self-determine the research whilst offering a valuable scaffold to ensure the PAR has a level of rigour to ensure the issues are explored fully and the findings are what will action the participants' social change. This action-reflection cycle is adopted in the iterations of PAR in this study to adopt the living theory methodology for this PAR.

Living theory developed from the living practice ideas of Carson and Sumara (1997). Carson and Sumara's (1997) approach rebukes the criticism that AR does not follow the prescribed methodological procedures since it reconceptualises educational action research as a living practice which explores the myriad connections created throughout the research between the researchers' interactions and experiences. AR involves diverse individuals exploring personal issues at a particular time in their lives; the research is uniquely subjective and in a state of flux and repels the approach of the traditional fixed research methodology:

> participation in educational action research practices are particular ways of living and understanding that require more of the researcher than the 'application' of research methods. (Carson and Sumara, 1997: xiii)

Whitehead states living theory supports the role of small-scale AR by practitioners in creating educational theory which can develop the pedagogy underpinning practice and policy. He describes the disadvantages of large-scale research which can highlight areas which need improving on a large scale but hide individual issues which, while not statistically significant, are significant to that person and need addressing for positive social change to affect their life. This can help to explain the issue in existing transition literature which the earlier review concluded is not redressing the students' difficulties in their mathematics transitions. Despite a plethora of research studies which have generated theories to support transitions, the students' difficulties persist. Hutchinson et

al. (2018) concluded that the current approach to supporting transitions will take over 100 years to effect positive change. This is especially pertinent in the second iteration of the PAR in this study which is conducted during a worldwide pandemic which has brought unprecedented changes for these young people including school closures, border closures separating students' families and unparalleled uncertainty over their future as they finish primary school and begin secondary education.

The Research Assessment Exercise (2005) stated that research should show quality which is "world-leading in terms of originality, significance and rigour" (McNiff and Whitehead, 2011:2). McNiff and Whitehead (2011) argue this offers an opportunity for action researchers to create their own standards which show the findings are capable of being original, significant and rigorous without having to submit to the pre-existing standards which do not do justice to the essence of action research.

Living theory upholds the need for quality theory but infers a different meaning from quality than that used in existing research. Rather than quality being established by others' judgements of the research, living theory entrusts the researchers themselves to judge themselves through an ongoing reflection. Whitehead (2000) explains how an individual's ongoing reflection through questioning their practise, living their theory and continuing to question and evolve creates this quality in their living theory as it is constantly developed and refined:

> they learn more and their theory changes as they understand more. Further, because they are living what they learn, new knowledge emerged (Whitehead, 2000:92)

This reflection is embedded in the iterative nature of the action-reflection cycle (Figure *2*). Repeated iterations of the action-reflection cycle enable participants to critically engage with and develop the living theory which is true for them. This creates educational theory which has been tested and evaluated and modified by the relevant experts, the participants. Such theory can be considered as being original, significant, and rigorous and so the participants' findings can be seen as creating quality research.

Applying the lens of Freirean critical pedagogy shows how the participants are empowered through the PAR which, within the living theory methodology, develops students' epistemological curiosity to critically engage with the pedagogy of their mathematics transitions and effect social change in their own lives. This development of critical awareness of and dialogue with the pedagogy creates a praxis of critical pedagogy which further support the quality of the students' living theory as they become more critically aware of and empowered to interact with their pedagogy.

The use in this study of a living theory methodology of PAR and the theoretical framework of critical pedagogy creates strong connections between the methodology and theoretical framework of this PAR and underpin my ontological and epistemological position in this study. I illustrate how these overlapping connections converge in PAR

within a living theory methodology situated in a theoretical framework of critical pedagogy in Figure 3.

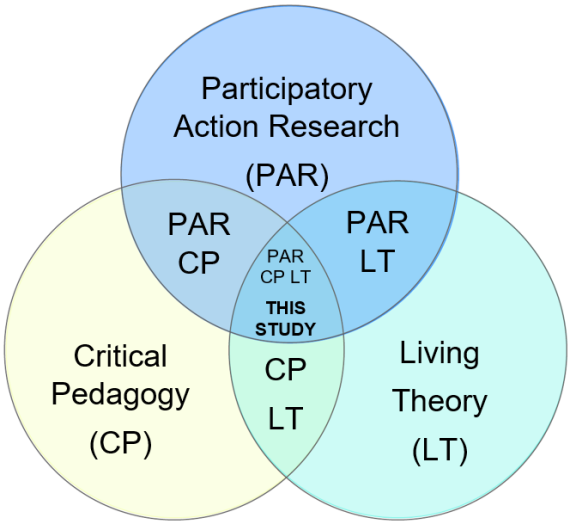


Figure 3: The connections between PAR, LT and CP and the position of this study at the intersection of all three.

This strengthens the students' position in the PAR by addressing the criticisms that could leave their findings vulnerable to being dismissed and further develops the praxis of critical pedagogy which in turn deepens the development of their PAR. Like the ever-circling iterations of the action-reflection cycle, the intertwining of living theory and Freirean pedagogy through PAR create a beautiful self-fulfilling prophecy of critical awareness, empowerment, and social change.

Living theory, therefore, creates a robust methodology for action researchers which addresses the criticisms identified earlier that AR is biased, unsound and cannot

contribute to theory. McNiff and Whitehead (2011) acknowledge that without the use of living theory as a methodology, those who conduct AR “will continue to be relegated to the ranks of good practitioners but not good theorists.” (McNiff and Whitehead, 2011:8).

An answer to these flaws would be to situate the PAR in the existing hegemonies of social science epistemology whereby the findings would be stripped of their subjective meaning and seen as being valid and capable of contributing to theory if they can be reproduced in a quantitative study conducted by those seen by the established research community as being ‘real’ researchers. This approach is seen in existing transition research and has been shown to be ineffective in resolving the students transition difficulties and the resulting social injustice. I have set out my case here for exploring whether PAR within a living theory methodology can contribute theory to amend the mathematics transitions policy and practice and, in doing so, create a Freirean critical pedagogy and effect positive change for the participants.

Freire (1970/1993) explained the significance of an “authentic praxis” (1970/1993: 25) by which the oppressed must be empowered through the research itself. Freire stated that the theory of praxis “cannot fail to assign the people a fundamental role in the transformation process” (1970/1993:99). Research which seeks to empower cannot do so if the research in itself oppresses people by limiting their role as research subjects. Adopting living theory in the PAR of this study supports the development of praxis which gives the students a fundamental, empowered role in the transformation of the pedagogy of their mathematics transitions.

I extend McNiff and Whitehead's (2011) criticism of the "epistemological hegemony" (McNiff and Whitehead, 2011:46) to non-participatory AR projects. When viewed through the lens of critical pedagogy, non-participatory research which seeks to effect positive social change for the research subjects is seen as oppressing these students into a role of research subject; of passive student not student-teacher. Such non-participatory research, therefore, adds to the social injustice it seeks to redress.

McNiff and Whitehead (2011) call for "collaborative attention" (2006:8) from practitioner and academic researchers to develop a living theory basis for the methodology of AR but I believe this should be extended to the research subjects of AR who can, as participants in the AR, contribute to and share the methodology of the research, strengthening its capacity to create knowledge which can effect positive social change. Fourteen years after McNiff and Whitehead's (2011) call for greater collaboration between practitioners, I call for deeper collaboration between all involved in the AR, working as co-researchers to collaboratively create knowledge through PAR built on the living theory methodology.

I identify a critique of existing PAR which centres on empowering adult educators through participation in knowledge creation for failing to seize the opportunity to emancipate students. Viewing this through a lens of critical pedagogy shows the social injustice in such PAR. Roholt and Baizerman (2019) describe the traditional view which permeates research that young people are "inarticulate, incompetent and apathetic" (in

Berson, Berson and Gray, Eds. 2019:94). I refute this assumption and seek to establish a precedent for young students, aged ten and eleven years old to undertake PAR to develop a critical pedagogy and action create successful mathematics transitions.

In McIntyre's (2008) comprehensive review of PAR, the references cited are PAR with adult participants. More recently, Berson, Berson and Gray (2019) confirm that while there has been a development in research from children's perspectives, there is a need for development of research with participatory methodologies with young people. This supports my criticism that PAR needs development to include students as participants and further justifies the contribution this study can make to the field.

> despite these developments, questions over the extent to which children can free of adult filters and influence merits sustained scholarly attention (Berson et al., 2019: ix)

McNiff (2017) states it is a responsibility for everyone to carry out research if we wish to challenge existing ideas and create solutions for ourselves:

> You don't have to do what you are told. You have the right to dissent. You have a responsibility to research. (McNiff, 2017:94)

I interpret this to include all people, young and old. Berson, Berson and Gray (2019) call for the development of “diverse methodologies to elevate children’s voices and actively engage them in the production of knowledge” (2019:ix) and, I believe, the PAR of this study can contribute to this development.

4.7: Conclusion to chapter

The bringing together of critical pedagogy, PAR and living theory creates a supportive framework for the students at Oryx to explore their upcoming transition in mathematics. The critical pedagogy framework highlights the importance of empowering students in this research to spark their epistemological curiosity and the living theory methodology reframes educational theory, together grounding this PAR which positions students as the experts in their own transitions. These epistemologically empowering theories combine in this PAR to elevate the students’ voices in their transition. Through the iterative action-reflection cycle of PAR, the students can understand issues which are relevant to them and explore support to redress these to experience a more positive transition. This, therefore, addresses the research questions of in what ways can PAR, combined with living theory, support students to understand the primary-secondary mathematics transition, and to experience it more positively? This powerful combination frames the research conducted in this study, the methods of which are set out next.

Chapter 5. Exploring Transitions: Methods

The subjective nature of PAR is reflected in the methods used. In this study, I conducted a pilot to develop my understanding of PAR and trial methods and then completed two cycles of PAR over two years. These two iterations had a shared foundation in methods and ethics but also individual elements. The shared methods applied are described first and then the individual elements of each cycle are set out in turn. Finally, the ethics of this research are described

5.1: Shared methods

The methods common to both iterations include the PAR research question, the ethical approach, the timings, the type of methods and the approach to analysis and verification.

The PAR research question is how can we create successful maths transitions to Y7? This was drafted in line with Whitehead's (2019) discussion of the key question he asked himself in developing a living theory to evaluate his own educational practice. I consciously omitted the phrase 'make maths transitions more successful' from the research question of this thesis as the term 'successful' in education is often associated with academic attainment. As discussed in more depth in the next chapter, it was not the aim of this research to raise post-transition attainment as this aim would negate the need to reject the existing pedagogy and would instead support and further entrench the epistemological hegemony I have identified as being social unjust.

The literature review found that there is no existing PAR with students to explore this primary-secondary mathematics transitions. Groundwater-Smith and Mockler (2019) found that there is limited PAR in any research area with younger students, concluding that “engaging with student voice work in the context of participatory action research, such as we advocate here, is, accordingly, a practice-changing practice.” (2019:31). Given this PAR is exploring new territory, it is appropriate (Jolicoeur et al., 2019) for an adult to act as the lead researcher to instigate and guide research. This may seem incompatible with the tenets of PAR but with “reflexivity” (Warin, 2011:806) and remaining “vigilant throughout the project” (Jolicoeur et al., 2019:55) this can, I argue, be a valuable structure for the research design.

I was the lead researcher in this PAR, adopting a role as facilitator to monitor deadlines, share resources and liaise with teachers to action the students’ findings. This also involved sharing information about research skill such as the mosaic methods (Clark and Moss, 2011) and coding approach. I find support for this role in Freire discussing the role of a teacher within problem-posing education to address “the need for explanation and exposition whereby the teacher sets forth his/her knowledge.” (Freire, 2001:81). Initially, I had reservations about the role of lead researcher diminishing the fundamental power sharing epistemology at the heart of PAR. In practice, I found that this was a necessary role given students do not currently have the power to conduct PAR unless it is instigated and managed by a teacher.

Grounding this PAR within the critical pedagogy theoretical framework guided my research design as I was reminded that socially unjust means cannot justify social just ends; I cannot abuse my power by coercing students, even if I believe this might have a positive result for students because this would be an act of oppression which embeds rather than resolves their disenfranchisement. In keeping with the advice to be "transparent" (Brydon-Miller, 2009:248) and clear about the elements of PAR, I shared the roles and responsibilities of the participants to create a transparent framework to underpin the PAR and reduce the power imbalance. This information is collated in Table 2.

Table 2: Roles and Responsibilities in this PAR

Who	Roles and Responsibilities
Student participants (Optional withdrawal at any point)	Complete the five stages of the action-reflection cycle: Observe, Reflect, Act, Evaluate and Modify.
Lead researcher	Design the research questions. Establish the research theoretical framework and methodology. Instigate the research: recruit participants. Share resources regarding mosaic methods, action-reflection cycle and coding. Time keeping including setting and monitoring deadlines. Communicating including with participants and teachers.

At first glance, this seems as though the lead researcher has a dominant role in the PAR but, I argue, this division of roles and responsibilities empowers students as co-

researchers alongside the lead researcher whose additional responsibilities are administrative. I positioned myself in this PAR not “as an expert, but instead as a learner” (Udas, 1998:602), to facilitate authentic participation whereby participants “set the agenda of the inquiry, participate in the collection and analysis of data, and have control over the outcomes of the research” (McTaggart, 1991). I discuss the limitations and implications of the PAR findings in chapter seven.

All PAR meetings were planned to be audio recorded and transcribed. In iteration one, these meetings were audio recorded which I transcribed and in iteration two, I transcribed the online group chat. This decision was made following a review of research methods literature (Bryman, 2016) after which I concluded that the focus group method was most appropriate to the nature of the PAR. This gave a flexibility and enabled them to speak openly and critically discuss together as a group, supporting the five stages of the action-reflection cycle (McNiff and Whitehead, 2011).

The meetings were designed to be a focus group as described by Bryman (2016) as a:

> form of group interview in which there are several participants (with) an emphasis on a particular fairly tight defined topic; and the accent is upon interaction within the group and the joint construction of meaning. (Bryman, 2016:501).

The focus group method is stated as being appropriate for participatory action research (McNiff, 2017; Bryman, 2016, Whitehead and McNiff, 2006) and as being well suited the living theory methodology as it supports students in creating their educational theory. This, Whitehead and McNiff (2006) argue is “essential in order to maintain your research as action research and not let it slip into social science research.” (2006:64).

I argue this approach also suits the ethical considerations of this PAR with young students since the focus group method is described as reducing the power imbalance of other forms of educational research as “participants are able to take over much of the direction of the session from the moderator” (Bryman, 2016:502) and this elevates the “voices of highly marginalized groups”(Bryman, 2016:502), such as the students in this PAR.

Disadvantages of the focus group technique is that participants can interrupt or cross talk and this is “difficult to prevent” (Bryman, 2016:521) and this was found in the two iterations of PAR as discussed in chapter 7.3 with the example of Renn and Ana. I found in this research that while this was present, it was not a limitation but a positive and is evidence of the critical dialogue which Freire (1970/1993) states is vital for the development of the students’ epistemological curiosity.

Other disadvantages to this approach are listed as being the amount of time it takes to transcribe the conversations and while this was a time consuming, I found this process

insightful for engaging with the students' responses. A limitation which warrants further exploration is that of the "possible problems of group effects" (Bryman, 2016:522) and I feel this may be relevant in this research with young students who are certainly exposed to peer pressure in other aspects of their lives.

Typically focus groups are quite small, consisting of between four to ten members (Bryman, 2016:504). In this PAR, the group size for the first stages in iteration one exceeded this with 26 participants in the observe and reflect stages of iteration one. I argue the focus group design is flexible enough to justify this larger group size and this is to be expected in research such as this PAR where the participants have ownership on whether they take part or not. I do reflect on the scale of the focus groups and the impact this may have had on the differing degree of empowering participation of the students in section 7.2.

An unexpected advantage of this approach was the flexibility in delivery including both in person and online (Bryman, 2016:515) which supported the PAR to continue to when the school unexpectedly moved to online learning at short notice due to the COVID-19 pandemic.

The three elements of epistemic curiosity are playing a background role in informing the analysis rather than serving as analytic categories in this thesis. This is in line with Whitehead and McNIff's (2006) stipulating the need for action research within a living

theory methodology to maintain a focus on the participants developing their own understanding as they identify and engage with issues relevant for them and reflects the aim of this participatory action research which seeks to avoid “slip(ping) into social science research” (Whitehead and McNiff, 2006:64) which is the approach I critique in existing transition research.

The PAR was planned to coincide with the students’ transition experience and so in each of the two years, it took place during the second and third terms of Y6 and the second term of Y7. All students in each cohort were invited to take part and in total, 192 students completed the first stage, to complete a self-assessment questionnaire (SAQ, Appendix 2) whereby they rated their attitudes towards their mathematics learning in Y6 and Y7. All students were invited to take part in the PAR group with 37 students in total completing this over the two cycles.

Table *3* summarises these two years of PAR.

Table 3: Summary of the two iterations of PAR

PAR Stage	Iteration One			Iteration Two		
	Date	Number of Participants	Detail	Date	Number of Participants	Detail
Observe	April 2019	101	SAQ in maths lesson in school.	April 2020	91	SAQ in online maths lesson
		89	Respond using mosaic methods		67	Respond using mosaic methods
		26	PAR Group		11	PAR Group
		12	Collect data		0	Collect data
Reflect	May 2019	26	PAR Group	May 2020	11	PAR Group
Act	June 2019	22	PAR Group	June 2020	11	PAR Group
Evaluate	June 2019	101	SAQ in maths lesson in school	June 2020	91	SAQ in online maths lesson
		9	PAR Group		11	PAR Group
Modify	February 2020	9	PAR Group	February 2021	10	PAR Group

The two PAR groups (iteration one 2019-2020 and iteration two 2020-2021) met five times. Each meeting had a loose focus on one of the five stages of the action-reflection cycle (McNiff and Whitehead, 2011) but also supported students in revisiting the stages which I discuss in chapter seven as being a significant aspect of this research. The format of these meetings differed across the two cycles of PAR following the move to online school in the second iteration, but the approach to each of the five stages was the same throughout both cycles.

Observe

In the observe stage, all Y6 students were invited to complete a SAQ and share their thoughts and feelings about the transition using mosaic methods. In iteration one, 101 students completed the SAQ, 89 responded to the PAR research question using mosaic methods and 26 students joined the PAR group. In iteration two, 91 students completed the SAQ, 67 responded to the PAR research question using mosaic methods and 11 students joined the PAR group. The students had time allocated within a mathematics lesson to complete the SAQ and respond to the research question using mosaic methods, but this was optional. The PAR group met for the first time and I shared an explanation of mosaic methods and invited the PAR group students to use mosaic methods to explore the transition themselves. Iteration one, 12 students collected data from other students and none in iteration two.

Reflect

We then met to reflect on the data collected by the PAR group members and that shared by the Y6 students. We used thematic coding to identify relevant issues which we discussed as a group.

Act

In the act stage, each PAR group generated actions which they determined would address the issues relevant to them and their peers in the upcoming transition. I shared these actions with the secondary school mathematics teachers who put these into effect in the mathematics transition session in term 3 of Y6.

Evaluate

Shortly after this transition session had been completed all students completed the SAQ to re-assess their attitudes and the PAR group met again to discuss these SAQ findings and evaluate the impact the actions had for themselves and their peers.

Modify

The final modify stage was completed in the following February after the students had transitioned to secondary school. The PAR group shared modifications they would like to see in the next round of research which I then put into place with the new PAR group.

I first conducted a pilot study to develop my understanding of PAR and increase my knowledge and skills to act as the lead researcher. From this, I developed a way to explain mosaic methods and coding which were utilised in this PAR and which are described shortly. This also developed my reflexivity, particularly in being vigilant of students' consent and accepting students withdrawing from the research.

All students were invited to participate in the PAR group. I shared participant information sheet (Appendix 3) and parental consent forms (Appendix 4). Twenty-six students chose to take part in iteration one and eleven in iteration two. In the first iteration, I also gathered data from four students who attended other primary schools in Muscat and were transitioning to Oryx and interviewed six teachers: the head of mathematics in both the primary and secondary Oryx schools, two Y6 and two Y7 mathematics teachers. I discontinued this data collection and do not report the findings in this thesis as I was unable to meet these teachers or students from other schools in the second year and, as the research progressed, the PAR became more prominent and the focus of my attention.

As is seen in Table 3, 192 students completed the SAQ and shared their viewpoints with mosaic methods. The SAQs and students' transition perspectives collected using mosaic methods (see figures 4-5, 8-14) form the data of this study which was then analysed by each PAR group and myself to address the research question of this thesis.

The mosaic method is flexible and encompasses myriad forms of data collection including photographs, drawings, audio/video recordings, notes. I first used the mosaic approach during research into listening to student' voices in their transitions from Reception to Year 1 for my master's degree (Blackburn, 2009) and have witnessed how it empowers students to express their views in ways which best suit them. I selected mosaic methods as this method of data collection enables children "to document their point of view about issues that concern them" (Jolicoeur et al., 2019:64). The mosaic approach compliments the epistemology of this study, viewing students as "experts in their own lives" (Clark and Stratham, 2005:45). The mosaic approach centres on a view of students' positionality in research which sits within the theoretical framework of this study:

> Children are not seen as passive objects in the research process or in society in general but as social actors (which) places an emphasis on exploring children's perceptions of their lives, their interests, their priorities and concerns (Clark, 2011:11)

I designed the SAQ (Appendix 2) as a research instrument for students to self-assess these seven key attitudes:

- Confidence
- Resilience
- Motivation
- Enjoyment
- Voice
- Support
- Responsibility

The students rated each of these attitudes on a scale from 1-5 for how they feel about their mathematics learning in Y6 and Y7, totalling fourteen ratings and a possible maximum score of 70.

Each iteration began with all Y6 students invited to share their views on the upcoming transition using mosaic methods and complete the first SAQ. The second SAQ was completed by all Y6 students shortly after they had completed the mathematics transition session. An alternative option was to complete this second SAQ following the transition to Y7 in the following September, and this approach has been used by other transition researchers (West et al., 2010) but was not adopted here as I wanted to focus in on the impact of the transition support on the students' attitudes as they approached the transition.

The SAQs findings were analysed by the PAR group in the reflect and evaluate stages. In iteration one, we shared the paper copies the Y6 students had completed both before and after the transition session. In iteration two, we shared the electronic copies students had uploaded to the virtual learning platform we were using following the move to online learning. In both iterations, the SAQs were completed by Y6 students using pseudonyms chosen by the students so that these were anonymous. Following the completion of two iterations of PAR, I then analysed the data from the SAQs and compared this with the findings from existing transition research to understand the impact of this PAR on the students' attitudes towards their primary-secondary mathematics transitions.

Thematic analysis of the data was conducted with the participant researchers in our second meeting to reflect. While the students are novice researchers, McNiff and Whitehead (2011) state that action research "does not require professional training" (2006:16). An explanation of thematic coding was shared with the student participants, referencing Miles and Huberman's (1994) three stages of analysis: data reduction, data display, and conclusion drawing. I modelled how to look for words or phrases in the data, including identifying "outliers" (Miles and Huberman, 1994). Students colour coded to identify relevant issues they and other Y6 students expressed as relevant in the transition. Thematic analysis with students was piloted successfully in my earlier evaluation of the transition policy and has been found in other research (Gray and Winter's, 2011, Coad and Evans, 2008) to be effective in enabling "a greater

understanding of children's perspectives and helping to prioritise children's agendas in policy and practice” (Coad and Evans, 2008:41).

The students carrying out iterative thematic coding is evidenced in examples from both cycles of this PAR. In iteration one, students used coloured pens and pencils to colour code the Y6 students’ responses using the SAQs and mosaic methods (Figures 4 and 5).

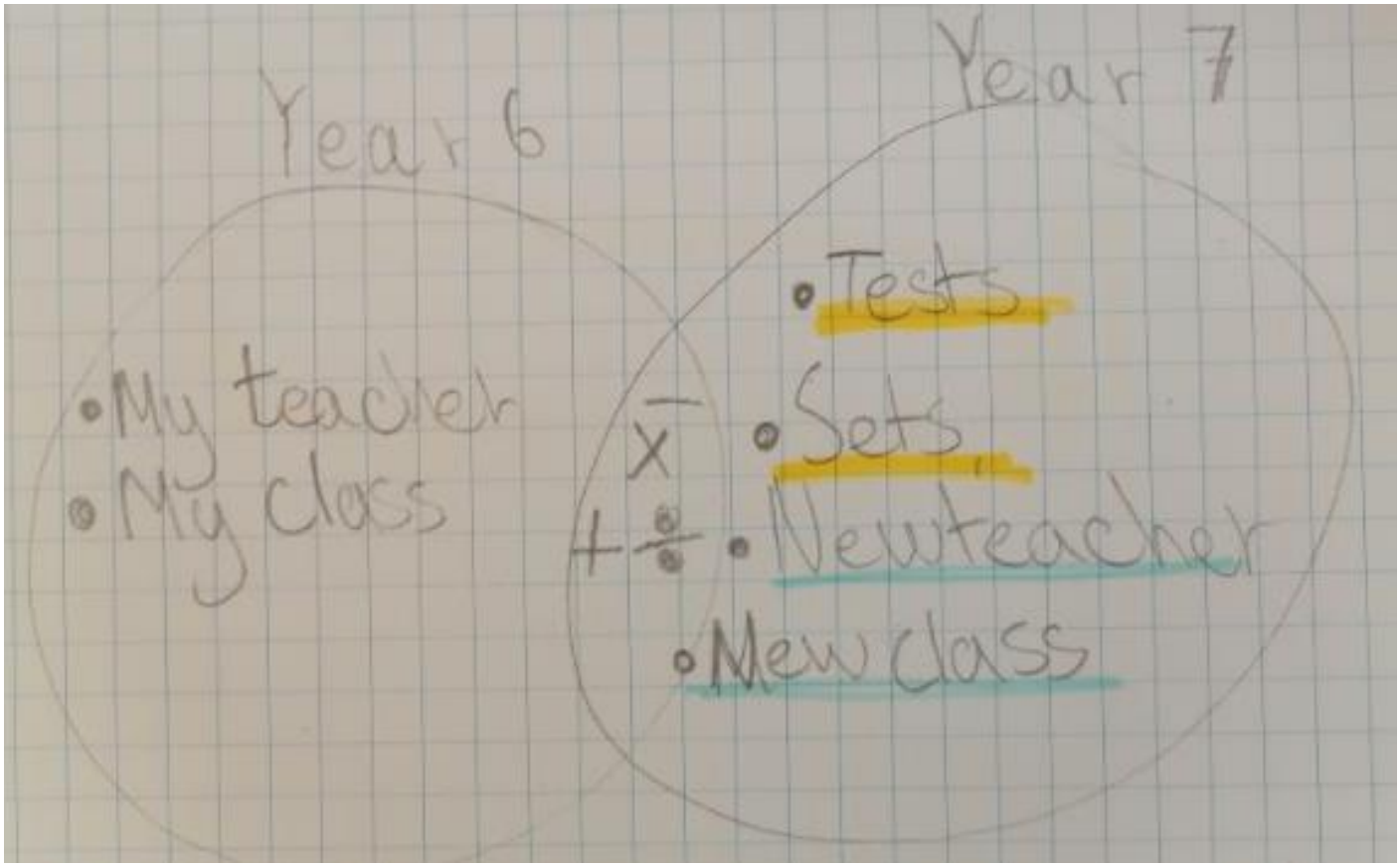


Figure 4: Example of mosaic methods from iteration one by (1)Silva coded by (1)Sprite.

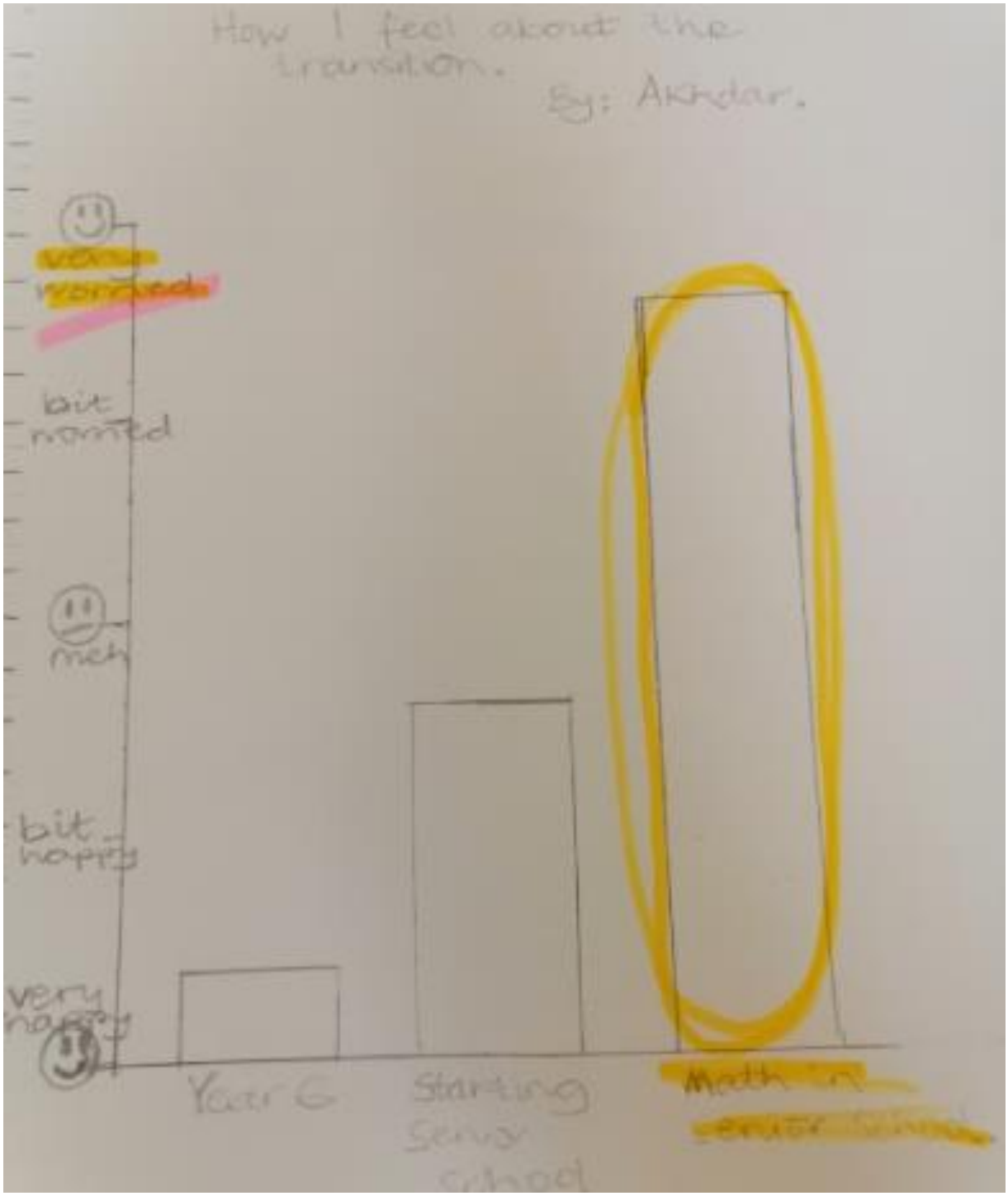


Figure 5: Example of mosaic methods from iteration one by (1)Akhdar coded by (1)Renn.

As we coded, we developed a shared set of colour codes (Figure 6) which was displayed on a flip chart for all PAR group members to develop and refer to.

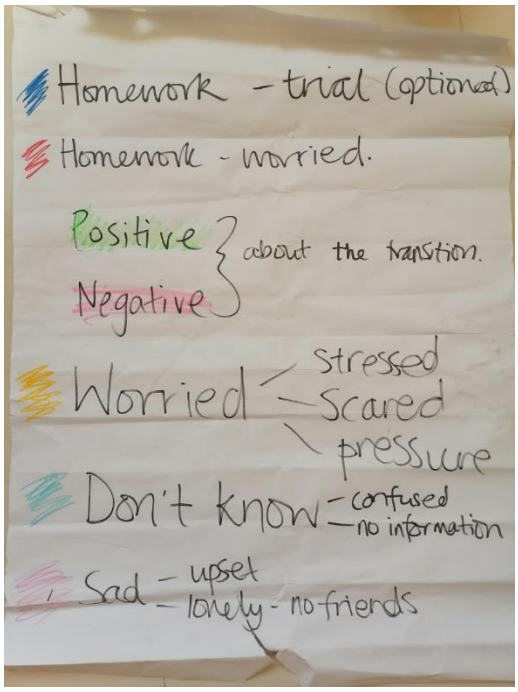


Figure 6: Shared set of colour codes in iteration one.

In iteration two this was adapted to fit the online format of this cycle with students collaboratively editing a Google doc to agree shared colour codes (Figure 7).

Colour codes

Feeling confident	
Feeling unconfident	
Feeling scared	
Feeling worried	
Sets	
Homework	
Feeling lost	
Want to know about the teachers	
Want the teachers to know about us	
Maths work will be too difficult	
Want to know what maths is like in Y7	

Figure 7: Shared set of colour codes in iteration two.

I shared electronic versions of the students' responses to SAQs and with mosaic methods by uploading these onto the online learning platform our school used at this time, Showbie. The PAR group members then coded these by using the pen tool to colour code the students' responses (Figures 8 and 9) and made notes on their own assigned Google docs (Figure 10).

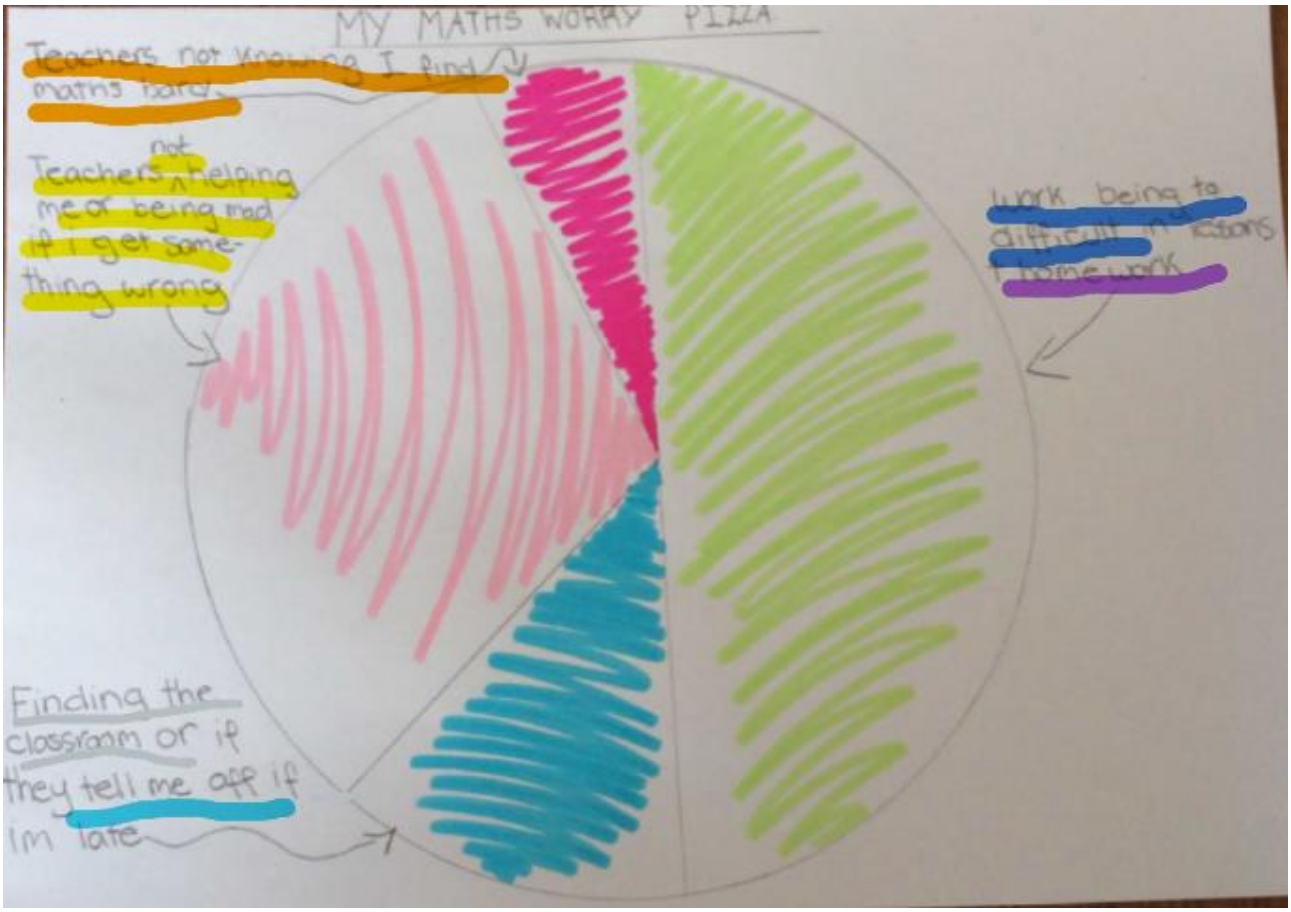


Figure 8: Example of mosaic methods from iteration two (2)Chatterbox coded by (2)Dr.Illuminate

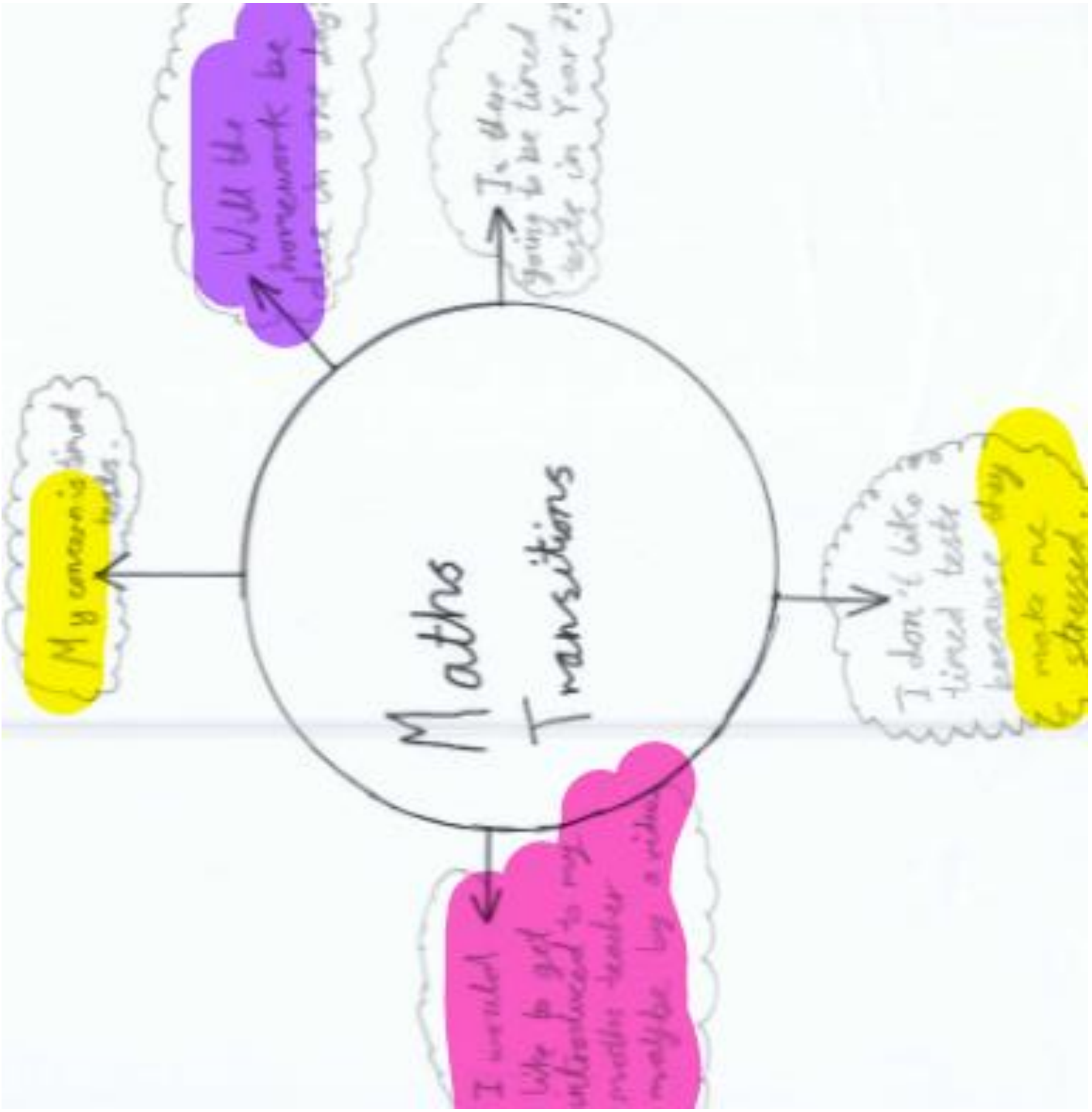


Figure 9: Example of mosaic methods from iteration two. (2)Rhino's response coded by (2)Student08

Reflect

Feeling confident		
Feeling unconfident		Many people are unconfident about the amount of homework given and the difficult level of the math in year 7.
Feeling scared		Not many are too scared but if they are they can get to know more about year 7 so they can feel more calm.
Feeling worried		Many people are worried about keeping up with the work,so maybe each one can get a tester sheet from Year 7 or learn more about Year 7 to feel better.
Sets		Some people are thinking about how the sets work and if they can change sets when they improve.
Homework		
Feeling lost		
Want to know about the teachers		Quite a few want to know their teachers. Maybe the teachers can make a video to introduce themselves.
Want the teachers to know about us		Some people want the teachers to know about them. Not many, I found 4 people.
Maths work will be too difficult		This is a big problem for most of us.
Want to know what maths is like in Y7		Many people talked about wanting more information about math in year 7.

Figure 10: Example of coding comments from (2)SarahFawaz

The evolving nature of both PAR and schools meant that while both iterations of PAR had a shared foundation in theoretical framework and methodology, there were some significant differences in the methods used which will now be explained.

5.2: Iteration one

The first cycle of PAR was completed between April 2019 and February 2020. All five meetings were conducted face-to-face during lunchtimes. The engagement rates fluctuated throughout the stages of the PAR with some students taking part in some elements and not others and some electing to withdraw (Table 3).

In the observe stage, I explained mosaic methods and invited the PAR group to explore this transition using this qualitative method to observe what issues were relevant for the and their peers. Despite this freedom to explore the transition from their own perspective in a subjective and rich way, the PAR group students used quantitative methods to collect data, designing questionnaires and surveys where they asked closed questions and collated responses in the form of tallies and ticks (Appendix 5). I wondered if this reflected the traditional stereotype of a researcher with a clipboard asking closed questions and recording the respondents' answers. I reflected that perhaps the SAQ with its more quantitative design modelled this and undermined our conversation about using mosaic methods. I respect the validity of the students' quantitative data and we explored it at the start of our reflect stage to discuss issues identified. However, the wide variation meant the data was not comparative and the numerical responses did not reveal relevant issues in any depth and so our focus shifted to the SAQs and responses Y6 students had shared using mosaic methods (Appendix 5). This response from the PAR students reflects the approach I found in existing transition research (Cantley et al., 2021; Jindal-Snape and Cantali, 2020; Van Rens et al., 2018; Paul, 2014; Attard, 2010; West et al., 2010; McGee et al., 2003;

Zeedyk et al., 2003). This, I argue, evidences the “epistemological hegemony” (McNiff and Whitehead, 2011:46) this PAR was situated in and the extent of the challenge we faced to work towards more emancipatory and empowering transition research where the students could share relevant issues and find ways to support a more positive transition. The impact of my prior decisions and potential skewing of the students towards certain methods of data collection is an area I will seek to redress in future iterations with a proposed additional meeting with potential participants before beginning the iteration of PAR to spend time discussing options for data collection and developing the students understanding of mosaic methods.

5.3: Iteration two

The second cycle of PAR was completed between March 2020 and February 2021. Following the first iteration, the primary school mathematics policy (Appendix 6) was amended to include the use of PAR in transition practise. This meant that this second cycle of PAR was planned to be completed by all Y6 students during their timetabled mathematics lessons. This was a significant outcome of the research and had the potential to strengthen the development of a critical pedagogy in the mathematics transitions since all students had the opportunity to engage in PAR as part of their mathematics learning. However, before students could begin, the school closed due to COVID restrictions. I took time to reflect on the ethics of continuing with the research in this unprecedented and, for many students, challenging context. I reflected that this context underscored the important potential support this PAR could affect and, having

consulted with my university supervisor to ensure my decision was not biased by own desire to complete the research, I continued in April 2020.

Since all teaching and learning was being conducted remotely through web-based platforms, I amended the PAR to be conducted online, creating a virtual space where all five stages of the action-reflection cycle were conducted. The more in depth, time-consuming PAR group was available for students who wished to join in, and I emphasised that this was optional and students who did join in could stop at any time. This flexibility in the living theory methodology meant all students could participate in the transition research in a degree which met their individual needs, and this is a strength which was invaluable in this new context we found ourselves.

All students completed the SAQs as part of their online mathematics lessons, this time uploading their completed questionnaire onto our online learning platform. Students were invited to use mosaic methods to respond to the research question and some did this about themselves, but none chose to collect data on their peers. I did not explore the reasons for this with the students so this needs further investigation, but I feel this may have reflected the challenges the students were navigating as we adapted to online school and were not yet confident with communicating remotely.

The students and I came together to discuss in an online chat and each meeting had a focus but supported students to explore and revisit all stages of the action-reflection cycle (McNiff and Whitehead, 2011). The potential this PAR had for wider social change and the impact for these students at Oryx are discussed in the following chapters.

5.4: Ethical considerations

While the ethical considerations are discussed rather late in this thesis, they are of the upmost priority and remain at the forefront of my thoughts and actions in this research. The nature of this research being the centre of a PhD thesis creates a paradox here whereby the theoretical framework and methodology focus on joint construction of knowledge and power sharing and yet here I write as a lone voice to tell the story of our collaborative efforts. This creates potential bias in my role of lead researcher which makes transparency in my motives and decisions throughout the research key. The covenantal ethics approach is adopted here to support this.

The covenantal ethics approach advocated by Brydon-Miller (2009) views consent as an ongoing agreement regarding ethics in research between the parties of that research. Rather than traditional contractual ethical agreement, which is fixed at the start of the research, covenantal ethics are mutually agreed and develop as the research takes place.

This seems at first glance a nuance but on deeper examination is a shift in perspective to enable a joint construction of the ethics underpinning the research. Contractual ethics are criticised as being a source of oppression in research due to the "potential for researchers to take advantage of the situation by furthering their own agendas while overlooking the interests of those taking part in their studies" (Brydon-Miller, 2009:250).

The covenantal ethical approach compliments the epistemological position of this PAR where the participants are students, and the lead researcher is also one of their teachers. While it can be said that in research within the current pedagogy of schools the "power differential between adult researcher and child participant can never be truly eliminated" (Gillett-Swan and Sargeant, 2018:6), this imbalance of power can be attempted to be negated in research design which is participatory such as the covenantal approach to ethics.

To apply covenantal ethics in this PAR, I set out the roles and responsibilities (Table 2) to be "transparent" (Brydon-Miller, 2009:248) about the roles of the students and myself from the onset. Students were invited to each session and attendance was optional. This was made explicit in all communications, both in writing (Appendices 3 and 4) and orally at the start of each meeting. This ongoing revisiting and adapting of consent before each meeting was, I argue, important to apply the covenantal ethics approach in this context working with young students in a school where I am also a teacher. There is evidence of the students exercising their right to review their consent to participate in

the numbers of students who withdrew during the PAR, 17 out of 26 in iteration one and one out of eleven in iteration two.

In keeping with the established ethical protocols which govern my PhD thesis, ethical approval has been granted by Lancaster University in May 2019 and permission sought from the Heads of all schools involved, as the “gatekeepers” (Warin, 2011:807) of the students’ ethics. The BERA ethical guidelines (2018) have also been followed. This contractual ethical approach has been followed to enable the PAR to go ahead within the existing system and the covenantal ethical approach is used throughout to support the epistemological basis of this authentic praxis. All students were invited to give informed consent at the outset of each session and it was explicit that their participation was optional and there were no consequences for not taking part. Participating children were assured confidentiality and anonymity as part of the consent process.

Having set out the theoretical framework and methodology for this PAR, I will discuss the findings but first, I pause to explore the possibilities this research has for greater social justice, as discussed in the following chapter.

Chapter 6. Pause to Reflect on the Possibilities

> Freire aligns himself with those who still dream and keep alive hope for a world without exploitation, inequality, and cultural enslavement (Aronowitz, 2001:7)

I pause to reflect on the possibilities this PAR has to positively impact on wider social change. Presently, this potential is significantly curtailed due to the context this study is situated in, but I pause here to imagine the possibilities, embracing Freire's encouragement of the importance of being full of critical hope and daring to dream of a brighter future.

An ontology based on values of critical love, respect and hope requires me to be authentic and transparent about the limitations of the research. This is, McIntyre (2008) reminds us, prerequisite for practitioners of PAR who "must *be* ethical, honest, and forthright people." (2008:12). While I dream of the social justice potential, I must be realistic about the impact of this research on the students and avoid my ego from derailing the focus. To do so would result in my role in this research becoming the type of false love which I have critiqued above. Instead, I must be open about the considerable limitations on the potential for social justice being realised for students through this research. This study is situated within the existing education system, both that of Oryx school and Lancaster University to which I submit this thesis, both of which have pedagogies which demonstrate some elements of Freire's banking education.

Freire has made it clear that change cannot happen spontaneously and so we must begin to work within the systems which we exist. I argue this is possible with the caveat that the limitations are explicitly set out. An example of this is seen in the covenantal ethic approach of this research. I adopted covenantal ethics as this dovetails with the aim of empowering students through the research but, at the same time, followed the traditional ethics approach to be able to secure the ethical approval from both the university and school, without which no research could take place.

Before I discuss the findings of the PAR in the following chapter, I pause first to discuss the possible social justice implications this research could have. This is a reverie to explore the second dual aim of this research: to explore the potential this PAR has for creating the epistemological curiosity which can spark students' future conscientization laying the foundation for future revolutionary action.

Freire describes how we can move towards this socially just aim "not by inciting exploited poor to rebellion" (Freire, 2001:75) but by working together to develop epistemological curiosity in small, focused projects exploring specific issues relevant to their lives:

> In truth, it's a question of working in some given area, be it literacy, health, or evangelization, and doing so as to awake the conscience of each group, in a

> constructive, critical manner, about the violence and extreme injustice of this concrete situation. (Freire, 2001:75)

I apply this to the PAR here focusing on students' primary-secondary mathematics transitions. This is a nuanced part of the students' educational experience and their lives but is, nevertheless, a significant aspect which has potential to have a considerable impact on their futures (Attard, 2010). The social justice impact of this transition has been established with the difficulties seen to impact students from lower social class disproportionately negatively. By developing students' epistemological curiosity through PAR as a praxis of Freirean critical pedagogy, they can firstly redress social justice issues in this transition and support themselves and, secondly, this epistemological curiosity can spark a critical awareness which can grow into future conscientization and support further, deep rooted social change in their lives.

Freire discusses the challenges of working within an oppressive pedagogy and his grounding in critical hope denounces "cynical shibboleths that justify inaction" (2001:72) and instead determines to work towards positive change, while acknowledging that "to change things is difficult but possible" (2001:75). In his writings on critical pedagogy in mathematics, Gutstein (2005) agreed that "it is not an easy process…but it is doable" (2005"209). Freire asserted that "educational change must be accompanied by significant changes in the social and political structure" (McLaren, 2004:6) and the scale of this challenge is described as feeling "politically untenable or hopelessly utopian" (McLaren, 2004:6).

The scale of the challenge can seem overwhelming, leading some to claim that it is "futile" (Reay, 2012: 589) to attempt to change the existing education system since "tinkering with an unjust education system is not going to transform it into a just system" (Reay, 2012:589). Freire acknowledged this while insisting that we must nevertheless have hope that an alternative is attainable. Freire states that educators can "take the first small steps" (Freire, 2001:70) towards revolutionary change even though we know that these first steps will not in themselves result in revolutionary change:

> In such a deterministic scenario, nothing new, nothing revolutionary, is possible. (Freire, 2001:71)

Despite this seemingly unsurmountable task, Freire remained full of critical hope that such change is possible through conscientization.

> in the face of pragmatic, reactionary, and fatalistic neoliberal philosophizing, I still insist, without falling into the trap of 'ideology', on the absolute necessity of conscientization. (2001:55)

I take note of both Freire's critical hope and the caution against falling into the trap of idealism as to do so would depart from the ontological values I have grounded this research in. In particular, the importance of avoiding a superficial love must be

consciously avoided since it would be convenient to present the findings from this research as being the solution to the students' needs and move on without acknowledging that there are deeper rooted social injustices inherent in their education which this research has not and cannot addressed. To do would be acting with the docile love which merely comforts students while further embedding the socially unjust pedagogy. Instead, I must answer Freire's call for an "'armed love', the fighting love" (Freire, 2005:74) which he stated has transformative and emancipatory power.

The potential this PAR has as a praxis of critical pedagogy is, I argue, valuable both for the impact on the students involved through empowering them to create more supported primary-secondary mathematics transitions but also in the potential this development of epistemological curiosity has to work towards the development of conscientization and revolution to break away from social injustice. Freire believed researchers need to have faith in people and "believe in (the) possibility to create, to change things." (1971:61) and McIntyre (2008) describes the potential of PAR, and that "believing in possibility creates space for people to reflect on themselves and the ways in which they can engage with their worlds" (2008:69).

Critical hope underpins my dream here of the potential possibilities of this PAR to create positive social change which could extend beyond the primary-secondary mathematics transitions. This PAR can create a small crack in the monolith of social injustice present in the existing education system. While small, this crack is significant as it gives hope of

change being possible. The “impossibility of change starts to crack” (Earl, 2015:17) and the possibility of change develops:

> critical theory of society guides us towards the location of these gaps and of cracks which foreshadow their emergence (Amsler, 2017:48)

Holloway (2010) describes the “opening of cracks is the opening of a world that presents itself as closed” (2010:9) as a way for the oppressed to create change themselves, to create cracks in the system. This focuses on seeing the potential for change, that this is possible; “we wish to understand the wall not from its solidarity but from its cracks” (2010:9). Each crack, Holloway (2010) argues is valuable and the more cracks we make, the further we weaken and break down the wall of oppression:

> Break it in as many ways as we can and try to expand and multiply the cracks and promote their confluence. (2010:11)

This PAR has, I argue, created a crack which grows deeper and wider with every iteration of PAR. The change in mathematics policy at Oryx, embedding PAR into the pedagogy of transition practice, scored this crack deeper, chipping away a section of oppressive pedagogy and opening up possibilities of more change as this PAR is extended into other year groups and other curriculum areas. This PAR also, I argue,

creates space for the possibility of future, wider social change and this possibility is, Freire and others (Amsler, 2017; Holloway, 2010; McIntyre, 2008) argue, to be valued.

Amsler (2017) draws on Bloch's principle of hope to show the value of such possibility. Amsler (2017) identifies the "particular promise in learning how to work with what Ernst Bloch referred to as 'undecided material' of social life" (2017:13) and Freire's "very hopeful utopia of an 'untested feasibility' (*inédito viável,* the possibility of doing something that has not been tried before)" (Freire, 2002:8). Connecting this to Freire's work, Amsler explains how people who are currently entrenched in an oppressive system cannot enter it as objects and exit as subjects but instead must, as Bloch describes, throw themselves in to that system and begin the process for themselves.

As Freire states, "the oppressed must be their own example" (1970/1993:28) and Holloway (2010) agrees, calling on the oppressed to be their own "heroes" (2010:11). Amsler (2017) calls upon us to act now rather than waiting in vain for the right time or conditions. Holloway (2010) emphasises the value of exploring, of stakeholders' "refusal-and-other-creation" (2010:6) whether or not this leads us to immediate change:

> Better to step out in what may be the wrong direction and to go creating the path, rather than stay and pore over a map that does not exist. (2010:13)

The results may not be revolutionary, but they have the potential to be, and this possibility is worth the effort as the alternative is more of the same endless oppression:

> There is nowhere else to start but from here, and no time ever but now: throwing in is a condition of possibility in its own right. (2017:18)

Therefore, the development of epistemological curiosity in this small-scale PAR can be seen as being valuable, not only for its immediate impact on the student participants but also on as a possibility for being a spark which could develop into a revolutionary flame. It is, I believe, important to engage with Freire's ideas and answer his call to further develop his ideas in different contexts. The act of discussing Freire's critical pedagogy in schools, of raising awareness of this with students, teachers and parents is in itself, I argue a valuable contribution towards the efforts towards positive social change. Aronowitz comments how contributing to the debate of education is "perhaps the most significant intervention" (2001:16) as this challenges the dominant narrative in education where "liberal educators are hopelessly outgunned- intellectually as well as politically and financially." (2001:16).

Freire is clear that he calls for conscientization "not as a panacea but as an attempt of critical awareness of those obstacles and their raison d'etre." (2001:55). Critical pedagogy itself will not resolve the issues but it is a necessary step towards positive social change. I apply this to PAR such as that at the centre of this thesis; in itself in will not result in large scale social change which overhauls our education system, but it is a

small yet significant step which creates positive social change for the students involved and offers possibility of further, revolutionary change.

After all, the goal is not to make students more effective in a system which I identify as being oppressive. This would be a hypocritical and socially unjust goal. Instead, I seek to support students to become critically aware of issues in one specific part of their education and be empowered to explore this and create change which supports them. This is not revolutionary, this is pragmatism with a revolutionary possibility, and I find support for this approach within Freire and others (Amsler, 2017; McIntyre, 2008). The PAR here is, I argue, a praxis of critical pedagogy and while not revolutionary, this (to twist Reay's words) "tinkering" (2012:589) can create cracks in the oppressive pedagogy and offer the possibility of a more socially just future in education and wider society. The cracks created are explored in the next chapter, the discussion of findings.

Chapter 7. Towards an Emancipatory Understanding of Primary-Secondary Mathematics Transitions

7.1: Introduction

This discussion of findings focuses on the final research question of what implications can we draw from the literature and this example of Participatory Action Research to demonstrate the importance of epistemological curiosity and epistemological empowerment in ensuring successful transitions? In this discussion of findings, I draw on literature from critical pedagogy and living theory to guide my understanding of the findings from this PAR, presenting theory from the earlier chapters together with students' discussions.

In reviewing transition literature, I identified three indications to ask when evaluate the literature for a praxis of critical pedagogy. I adapt these now to explore this PAR and structure the discussion of findings:

1. Do students feel the PAR creates opportunities for active participation?

2. Can the students identify relevant issues in their transition through the PAR and action solutions to these?

3. What impact does the PAR have on students' attitudes towards their primary-secondary mathematics transitions?

Using these indicators to interrogate existing transition literature developed my understanding of why the students' difficulties persist. I now use these same three indicators to explore the impact of this PAR. I present the findings from each iteration in turn, working through the five stages in order from observe to modify, to enable the reader to understand the chronology of the PAR. The iteration number of each cited extract is in parenthesis, for example (1)Renn, (2)LondonEye. The final section focuses on the limitations of the PAR and the implications for practice, highlighting the contribution to knowledge this thesis presents and leading into the conclusion to the thesis.

7.2: Do the students feel the PAR creates opportunities for active participation?

The levels of active participation were concentrated in the three stages of reflect, act, and evaluate. The critical pedagogy theoretical framework supported my analysis here and I connect the findings to literature to discuss the development of active participation.

When analysing the findings from the observe stage, I found little evidence of active participation, particularly in iteration one. In this first cycle, my voice dominated the transcript as I gave lengthy explanations. I reflected that this demonstrated the overarching oppressive pedagogy of the education system our research was situated in. I had subconsciously positioned myself as the subject empowered to speak and the

students who are “accustomed to passivity” (Freire, 2001:100) accepted this without question.

I also reflected that this illustrated the entrenched positions we started our PAR in within the existing pedagogy of our education system. The “legacy of inequality” (Shor, 1996:17) means that this PAR is situated in an oppressive pedagogy where we are positioned in our traditional roles as teacher and student. Both myself and the students were exploring a new way of learning together and this meant that we struggled initially to renegotiate our roles as co-researchers co-constructing knowledge. This difficulty and the mistakes made should not, I argue, negate attempts to explore renegotiating power and I find reassurance from other more experienced critical pedagogues who have encountered similar difficulties in their work:

> there is no simple way critical-democratic pedagogy can transform the anti-intellectual stalemate of an unequal status quo. (Shor, 1996:17)

Therefore, I found little evidence of active participation in this observe stage and I conclude that this observe stage did not spark the students’ epistemological curiosity. The subsequent meetings exploring the PAR stages did, however, reveal more active participation.

In the reflect stage of each iteration, I observed a considerable shift in the students' participation and, analysing this through the lens of critical pedagogy, this shows the spark of these students' epistemological had occurred. At the start of the reflect meeting in iteration one, (1)Trinity asked "what do you want us to do?", showing the passive participation which typifies the role of the object in banking education.

My theoretical framework supported my understanding that the teacher must be self-critical of their position. I reflected that I needed to consciously shift power from myself, empowered as the knowledgeable subject in banking education, to sharing epistemological power with the students. Shor states how he approaches this, taking care to "restrain my authoritative voice by saying as little as necessary." (1996:41). Freire emphasised the importance of both teacher and student speaking and listening, questioning and answering, together actively participating in an authentic praxis:

> What is really essential in this process is that both the teacher and the students know that open, curious questioning, whether speaking or listening, is what grounds them mutually- not a simple passive pretence at dialogue. The important thing is for both teacher and students to assume their epistemological curiosity (Freire, 1998:81)

At the start of the first PAR meeting, I spoke more than three quarters of the time but as I consciously restrained my voice (Shor, 1996) this reduced to one quarter. This created

space for the students to talk to each other rather than addressing me. This fashioned the open, curious process Freire (1998) describes for authentic, agentic exchanges which support the sparking of epistemological curiosity. This following extract shows the shift in the students from initially passive to agentic. (1)Ana starts by asking me what to do when I waited before replying, she moved into the space created, answering her own question and asserting “I’ll do it”. (1)Trinity too shifted from asking me what to do to engaging as an independent critical agent, his body language showing his change from passive to active participation as he leans into the conversation:

> (1)Ana: “Are we gonna use the colours as you said?”
>
> [I waited, leaving space for her to think or others to respond]
>
> (1)Ana: “We could make a key to show the meaning of the different colours.”
>
> (1)Trinity: [sitting up and leaning in] “We could shout out ideas and agree what colour to use.”
>
> (1)Ana: “Yeh, we can make a key of the colours and the topic. Like a colour coded key. We can put that on the board. I’ll do it.”

At the beginning of this reflect stage, (1)Trinity had looked to me for what he should do but now he liaised directly with (1)Ana and they took the lead in creating the shared set of colour codes (Figure 6). I observed that (1)Trinity sat up and leaned forward as he spoke, his body language shifting from sitting back in his chair waiting to be told what to

do to moving forward to actively engage in the discussion and make decisions himself. I saw the students' active participation develop as they engaged in coding the SAQs and responses using mosaic methods which they and their peers had completed and many of the students began to work together to code a piece of data, discussing what it represented and deciding how to code it. In this example (Figure 11, I observed (1)Jebel and (1)Trinity debate whether (1)Yas's response needed another colour to show this person felt a lack of confidence about Y7 mathematics being harder than Y6. They agreed that yellow (feeling worried) and light blue (don't know) accurately coded what was written.

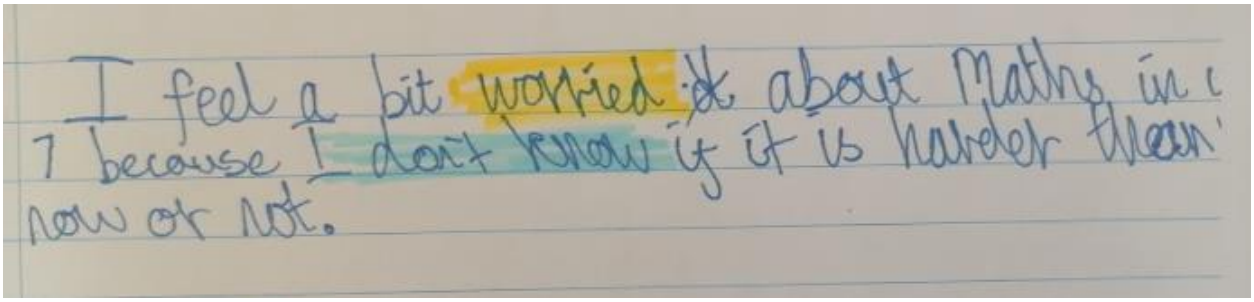


Figure 11: Active participation in coding the data. By (1)Yas, coded by (1)Jebel and (1)Trinity.

My reading of Freire showed me that the change from ingenuous curiosity to epistemological curiosity does not happen automatically, and that one of the "essential tasks of progressive educational praxis is the promotion of a curiosity that is critical, bold, and adventurous." (Freire, 2001:38). I consciously stepped back from the role of teacher in the banking education by redirecting the students' questions to me back to the group. This opened up a sharing of knowledge construction between us as co-

researchers, a joint space for us to “assume [our] epistemological curiosity” (Freire, 1998:81).

This is seen in iteration two when (2)Smiley321 asked me “what would it be when a person said they are worried about sets. Is that coded as worried or sets?”. Instead of answering her, I redirected the question for the group to answer, asking “What do we think everyone?”. I saw this acted as a signal to the students of the renegotiation of our power in this PAR, that we were co-researchers, co-constructing knowledge. They responded to this positively, seizing the offer to actively participate. Their responses showed a development in their agentic voice, articulating how they wanted to code the data. I noted that the students’ immediate response shows they were ready to engage in this critical dialogue and the only barrier to them was their positionality in the oppressive pedagogy where they have learned to stay silent, listening to the adult espouse wisdom until they are granted their turn to talk.

> (2)Student08: “I did both colours. I thought it was good to get as much coded as we can to help us understand what is going on. I don’t think it matters if we code it two different colours if they are talking about two issues at the same time.”
>
> (2)SarahFawaz: “I did that too Student08. I have some with two colours too. I agree we don’t have to pick just one as sometimes we feel mixed up thoughts or feelings about one certain thing.”

(2)AlbusDumbledore: “I did the same too. We need to see how much each issue is bothering people so we code everything and then can look at that. We can look at that data then.”

(2)Smiley321: “Thanks. That makes sense.”

This subtle change, the redirection of epistemological power shifted us from the teacher-student contradiction of the banking education towards a more socially just problem-posing model. I understand that much more work is needed for this shift to change the monolithic oppressive pedagogy in education, as discussed in the previous chapter. However, this is, I argue, an example of the small yet significant positive change this PAR affected, a step towards a socially just critical pedagogy.

In the reflect stage of the second iteration, I observed that while the group of student participants was smaller, the student participation was more active. I wondered if a smaller PAR group size is relevant in empowering active participation and sparking epistemological curiosity. I recall Shor’s (1996) example of the after-school group attended by a smaller number of students where the outcomes may not have been as positive if more students had attended. Perhaps the scale of the group is important to create the space for critical dialogue which empowers all members. In a larger group, some students may not have the opportunity to participate actively and, therefore, not experience the sparking of epistemological curiosity. This observation can be further explored in the fourth iteration of PAR, due to start in 2022.

The PAR group students participated actively despite this second iteration of PAR being conducted online. An example is seen in (2)Dr.Illuminate's coding of their peer's response using mosaic methods. When our coding exhausted the colours the software we used had available for the pen tool, (2)Dr.Illuminate and others took the time to find a way to complete the colour coding we had agreed (Figure 7), using an asterisk and adding a key to explain this represented the colour maroon. I felt this showed a high level of active participation, particularly when remembering that the students completed this in their own time and at home during the early days of our move to online learning.

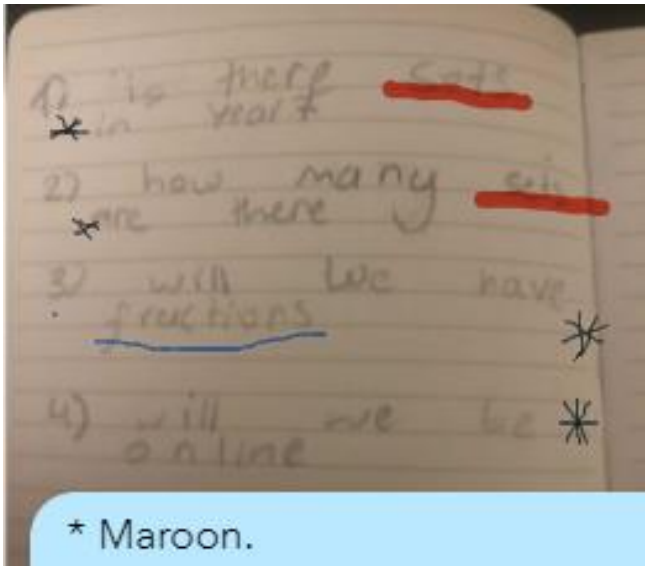


Figure 12: Active participation in coding. By (2)Marlin, coded by (2)Dr.Illuminate.

The students' active participation developed further in the third meeting of each iteration, focused on the act stage. The transcripts show the students' dominating the conversation with their voices accounting for more than 80% of the discussion in both

iterations. The students actively participated in the discussions, critically engaging with the subject matter. Here Lily shows how the students critically explored the existing transition approach, discussing what is effective and which areas they want to change:

> (1)Lily: “Well, most of transition week I think we keep as it is as it does give us lots of the things people have said are important to them. Mostly, information about where the lessons will be, who the teachers are and that sort of thing. But we could improve it to include what people have been saying is important and is missing right now.”

I observed the sparking of their epistemological curiosity as they discussed the differences between the existing transition approach where teachers alone determined what support to put in place and our PAR where the students and teachers together create this support:

> (1)Christopher: “I think if they speak to us and listen to our questions and share information like Lizzy said they will be able to plan what we want to do and what can help us. Because, technically, it is us that’s learning and it’s us that is doing everything so if the teachers do what they want to do, we’re really not learning properly.”

This is seen again in iteration two where the students articulately discuss how to organise sharing information in our context of online learning:

> (2)Unicornbanana: “As we can see, the majority are concerned about homework and detention so we can ask for some information about that”
>
> (2)Happy21: “We could make a folder for people who would like to know the year 7 teacher”
>
> (2)Unicornbanana: “Showbie is safe and also easy since we use it everyday”
>
> (2)Student08: “A lot of them wanted to meet or know their teachers which I think could happen through video sessions.”

I observed how the PAR group students connected their suggestions directly to the reflections made in the earlier research sessions, showing the ongoing development of the epistemological curiosity. This confirmed to me that these young students could complete PAR and create purposeful outcomes. This is also, I argue, evidence of the students’ attitudes transforming as they actively engage in the research to question what is important to them in this transition. This is a hint of the banking education being rejected, a small yet powerful move towards the complete rejection of banking education which Freire implores us to do (1970/1993). As Freire stated, “to change things is difficult but possible” (2001:75) and my ontological position, grounded in critical hope supports the power of this opening up possibilities, “Offering alternatives.” (Amsler, 2017:84) which create small yet powerful cracks in the pervasive oppressive pedagogy we are in.

I noted ongoing active participation in each iteration's meeting to evaluate our PAR when the students discussed the impact their PAR had on their own and others' attitudes towards the upcoming transition. They seemed proud of the positive results of their research, discussing how it had supported them and their peers:

> (2)AlbusDumbledore: "It has made us less worried about Year 7 maths now. I think it has really helped."
>
> (2)Rosa: "I remember Battleship mentioning that the sample maths lesson really helped him feel more confidence."
>
> (2)Student08: "Some of my classmates have said that they feel less anxious. I feel like what we did helped a lot of us."

This increased feeling of confidence was shared by others in the evaluation as being a positive outcome of the PAR, as expressed by (1)Lizzy:

> (1)Lizzy: "I think it was good because it has stopped lots of us worrying. We have realised that it probably won't be as bad as we thought it would be."

The development of the students' agentic voice is seen as they actively participated in this evaluation stage, discussing their increased sense of having a voice in the transition and how this had positively supported them in the upcoming transition:

> (2)SarahFawaz: "I could see that the senior school teachers had listened to our ideas and put them into action."
>
> (2)LondonEye: "Yes. I saw our ideas in that lesson. They introduced themselves and went through all the information about what we would learn next year and they gave us reassurance they would help us."

The final meeting to modify the PAR took place after the students had transitioned to Y7 and I observed a significant decline in the participation of PAR group members in the first iteration with only nine out of twenty-six students participating in this final stage. In the second iteration only one student did not complete this final stage. I conject that this may be due to the shift in pedagogy and the result of the changed methods of communication between the two cycles of PAR. In iteration one we were all in school and I passed messages to the now Y7 PAR group members' teachers to arrange this modify meeting. Perhaps these messages were not delivered or perhaps they were read aloud, and other students responded negatively, dissuading the students from attending. I also wondered if this was the result of the students now being in secondary school, which represents a pedagogical shift (Paul, 2014) which may have entrenched the students' positions in the banking education even further, resulting in them feeling

the PAR could not benefit them. In iteration two, our shift to online learning due to the pandemic meant all students now had school emails so I could communicate directly and privately which may have meant they felt more comfortable to take part and explain the difference in drop out rates between the two cycles of PAR.

I observed that the PAR group members who did attend the meeting demonstrated active participation and the ongoing epistemological curiosity sparking through our research, articulately discussing the impact of their PAR and suggesting ways to amend the PAR for the next cohort:

> (1)Renn: “I thought that it did help us a lot that we had thought about this for ourselves and talked about it together. I know we only do transition once so we didn’t see what it was like fully before but we did see what the school policy is and we had heard about what it is usually like and I think we got a lot more out of it, I think we got better prepared by saying we want this and we would like that and then the teachers did it. I think Y6 should do it every year to help them prepare for senior school.”

The living theory methodology was, I argue, fundamental in supporting the active participation I found in these reflect, act, evaluate and modify stages of both iterations. This methodology gave a structure to the PAR which was accessible to all student researchers giving them a flexible yet supportive scaffold to guide them in working

through the action-reflection cycle and to take ownership of the research. The living theory methodology underpinned this PAR as a transformative praxis which can be accessed by all the stakeholders to effect positive social change.

7.3: Can PAR support students to identify relevant issues in their transition and action solutions to these?

I saw here the impact of the living theory methodology in supporting students to identify relevant issues and action solutions to support their primary-secondary mathematics transition.

I noted that there was little evidence of students identifying relevant issues and actioning solutions in the observe stages of each iteration. As earlier, I felt this was due in part to my inexperience as a researcher but also the entrenched positions the students and I were in. An example is (1)Renn asking “Do you have copies of just ours of others’ questionnaires too? Can we see everyone’s?”, seeking guidance and permission from me, positioned as the sole epistemologically empowered person to determine what we should do. After I said yes, (1)Trinity then asked “So can we read them?” showing the entrenched passive position the students started our PAR in. On reflection, I feel it would be beneficial to have a meeting prior to starting the PAR stages to give time for us to renegotiate our epistemological positions and enable the potential the observe stage has for sparking epistemological curiosity to be explored fully.

I observed the development of a student's thoughts in the reflect meetings in both iterations as they made a statement and refined it, shaping their understanding and forming ideas. This is seen more clearly in the first iteration where students responded verbally and I noted how they paused and repeated themselves, refining their ideas. Initially students focused on issues which were relevant for themselves as (1)Mia showed "I am nervous, yeh…maths is a hard subject. I think it'll get even harder in Y7.". As the students shared how they felt individually, this triggered a realisation of shared experiences and issues in their transitions. (1)Dill expressed this, noting "I feel like everyone will be worried".

I observed in both iterations how the students moved from discussing the issue in the third person to first, a shift in syntax evidencing them identifying that others share similar issues in the upcoming transition:

> (2)Happy21:"I feel the same actually. It is worrying and a bit scary and I don't feel so confident about what maths is going to be like in year 7"
>
> (2)Unicornbanana: "I am the same. I worry about it a bit. I think people were honest here as we do all feel worried and not so confident about it."

These extracts show, I argue, the spark of epistemological curiosity as these students identify relevant issues. They developed this as they explored the SAQ findings, discussing what they had noticed about what their peers reported and reflecting on how

they felt about this. As they talked, the students' voices grew agentic, dominating the discussion without my input:

> (1)Bravo: "I think if you plan what's going to happen, like if you know, then it'll be easier. But if we don't plan, if we don't know what it will be like then it's harder 'cause how can we prepare?... This bothers me and I can see it bothers lots of others too."
>
> (1)Shark: [nodding] "I'm a bit worried about sets and I found that was worrying loads of others too. Yeh, like Bravo…so yeh, I think sets is a big worry for lots of us."
>
> (1)Trinity: "I worry about sets and my friends and me have talked about that after we did this self-assessment thingy."

The students did challenge each other if they disagreed or did not understand, evidencing their move away from the pedagogy of banking education towards a problem posing model. In their critical dialogue, they explored what issues were relevant to them, rather than trying to give the 'right' answer. In the reflect stage of each iteration, I found a reduction in the students looking to me to validate their ideas or answer questions, a significant change from the earlier observe stage as discussed above. As they develop epistemological power, the students began to identify issues themselves, sharing ideas with each other and, through their critical dialogue, shaped their understanding, their living theory of how to support their mathematics transition.

An example is (2)SarahFawaz suggesting they ask current Y7 students to share their feedback on what the transition was like for them. (2)Happy21 challenged this, arguing that this might not be an effective support since “everyone has different experience and opinions.”. (2)Smiley321 and (2)Student08 responded with their perspectives and (2)SarahFawaz took this on board, amending her suggested action to resolve the limitations:

> (2)Student08:“That would be a great idea...having present Y7 students sharing their experience. It will be different for everyone though, I agree.”
>
> (2)Smiley321:“So maybe we ask all of them. Then we can have more than one who will tell their experience of being in year 7.”
>
> (2)SarahFawaz:“Maybe every year 7 student can explain their experience. So we get an idea of what is like. We know it will be different for each of us but it might be useful to help those who are not sure and are worrying.”

This demonstrates how the students identified relevant issues and suggested solutions, developing their living theory of what will create a successful mathematics transition together through their critical dialogue in the PAR. This lack of ego was refreshing in these discussions; students listened and reflected with honesty, together shaping their ideas without conflict or hierarchy.

Analysing the findings from the act stage, I observed the students' living theory begin to take shape as they built on each other's comments to firm up concepts and determine what action to take to create more supported transitions. The students were noticeably more confident and vocal, their agentic voice evident in the longer responses, articulating their thoughts in detail and working together to find solutions to action with minimal input from me.

In both iterations, the students developed actions which I then presented to the Y7 mathematics teachers to put in place in the upcoming transition support session. In this example from iteration one, the students discussed how the existing mathematics transition practise of a fun mathematics-themed quiz would not resolve the concerns they had identified and they instead wanted further information. They challenged each other, together creating an action to support the transition:

> (1)Trinity: "so maybe we can do a game just at the start of the maths transition lesson, just to get to know each other a bit, so the teacher knows us and we get to know them. It could be fun. But then we do a proper lesson for the rest of the time."
>
> (1)Ana [nodding]: "Yeh, that's a good idea, Trinity"
>
> (1)Renn: "We could ask for a fun game to relax everyone and then get on to the information because that is the way to help what everyone is saying it is scaring them."

(1)Shark: [frowning slightly] “I don’t really think that’s a good idea for helping all of us who are worried or have questions and want to know what is going to happen to us.”

(1)Trinity: “But I'm saying we just do the quiz for a little bit, just 5 or 10 minutes at the start and then we move on to a lesson so we can deal with the worries.”

(1)Shark: [nodding] “Ok, that would be good. Let’s say that then.”

The power of the shared critical dialogue is seen here as the students voiced their thoughts and revisited ideas. I noticed in both iterations how another student would repeat the point in a slightly different way, a distorted echoing which further refined the idea. In this extract from iteration one, (1)Lizzy states that if teachers gave Y6 students more information about Y7 mathematics during their transition lessons, they would feel more confident. (1)Max rephrases this idea that more information would help him and others to feel more comfortable. (1)Max develops the agency of (1)Lizzy’s idea, saying that this information should be what the students want to know, not what the teachers think the students should know. As she repeats (1)Max’s words, (1)Lizzy connects their ideas of confidence and feeling comfortable and suggests that asking for more information would support the development of both:

(1):Lizzy: “I think the more information we get, the more confident we will be. Everyone is saying, well, a lot of people are saying they are worried about this or that. Maybe the truth is that Y7 maths is really hard, but at least if we know that,

we can get ready instead of just worrying. And maybe the truth is there is nothing to worry about."

(1)Max: "That's it for me too. They want us to have a more comfortable time in Y7 but if they only tell us what teachers think we want to know then it might not be comfortable for us. And we need a, like, smooth transition."

(1)Lizzy: "Yeh, so I think we should ask for as much information as we can so the Y7 maths teachers can use the transition lessons to help us get ready to go to Y7 so we don't worry so much and do feel like we are ready and we can handle it. If we get the information, it will help…We should ask for information for all the things we have asked about so that we feel more confident, more comfortable as you said."

The students cross referenced their own thoughts and feelings with those shared by their peers through the SAQ and mosaic methods. Here (1)Lizzy has noticed when coding their responses (Figure 13) how many other Y6 students report being worried, highlighted in yellow according to the shared codes we developed (Figure 6). I found all PAR group members in this iteration were able to similarly identify relevant issues and, I argue that this shows that the students can use the data to identify relevant issues and guide their thought process to finding solutions.

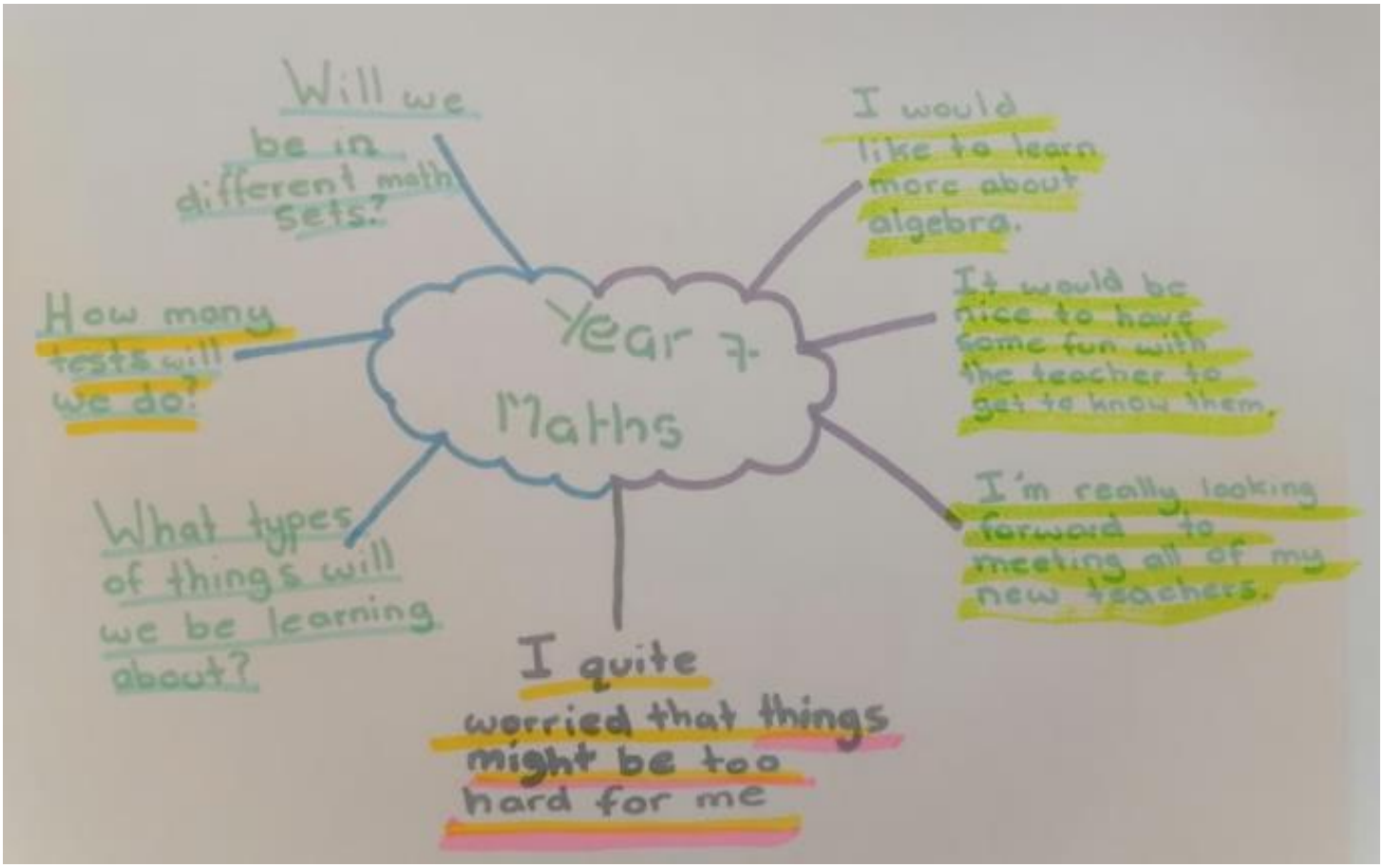


Figure 13: Identifying worries as a relevant issue for many Y6 students. By (1)Pirates coded by (1)Lizzy.

This critical dialogue empowers the students to act as "critical co-investigators in dialogue with the teacher." (Freire, 1970/1993:54) as they explore solutions to their own problems. In iteration one, I noted one student, (1)Renn took a more dominant role in the discussion. I reflected on Freire's comment that "the oppressed must not, in seeking to regain their humanity…become in turn oppressors of the oppressors" (Freire, 1970/1993:18).

However, while (1)Renn's comments were frequent, I found she did not lead decisions about what actions to take, instead asking open questions, such as "So what can we do to change this?". This contrasts with the traditional approach of transition research reviewed earlier where the adult researcher stands above the students, alone empowered to determine what to ask and what is worthy of being discussed. The living theory methodology of this PAR and the covenantal ethics approach created a respectful research space where everyone's views are valued. I observed (1)Renn use her elevated position to empower her fellow students, asking what can *we* do and respecting their responses. This observation was a powerful moment for me as a researcher exploring the social justice potential of PAR with students. It was also a proud moment as their teacher, to see these young people use their power in such a positive way.

When analysing the findings, I noted much evidence of reflecting in the meeting we held for the act stage. This demonstrates how the iterative, organic living theory methodology supports students to identify relevant issues and action support in this PAR, empowering the students to construct their own educational theory about their transitions. Other more traditional research would have, I argue, blocked such organic exploration or negated the revisiting of ideas which I found to be important in students refining their thoughts and developing their epistemological curiosity.

An example of this is seen in the following extracts of (1)Max who sets out his initial position based on what his older sister has told him but, in the discussion, begins to

question this for himself. Initially, (1)Max states his position that maths in Y7 is hard based on what his sister has told him:

> (1)Max:“I asked my sister and she told me what is like a bit and it sounds…it sounds not great really. The main thing that everyone finds difficult is not knowing how they’re gonna teach maths, my sister told me it is much more strict than in Y6.”

As (1)Max listens to the other Y6 students he observes that there are other perspectives. (1)Bravo says “we all have different things we worry about” and (1)Max then reflects that what his sister told him may not be true for him:

> (1)Max: “I get that actually because I asked my sister because she has done it, she has been through it herself but maybe her feelings are different to what mine will be and so when she says it is strict I get worried but maybe I won’t even think that when I get there. So really it is better if I find out for myself.”

(1)Max realising that others have different perspectives and concluding “really it is better if I find out for myself” is, I argue, evidence of him exploring Whitehead’s (2019) key question of how he can improve his own practise. (1)Max is now searching to author his own truth rather than continue to accept the version written by others. (1)Max identifying

his need to hear directly from the Y7 teachers reminded me of the reports of "transfer myths" (Chedzoy and Burden, 2005:33) told by Y6 teachers. Here (1)Max has identified an issue which is reported in other transition research, and he has found a solution to redress this. This is the site of (1)Max creating his living theory of what is important in his mathematics transition and what support he needs:

> (1)Max: “And maybe it is actually ok but we don’t know that so unless someone tells us what is going to happen, not knowing will just worry us. And it should be the teachers who are actually Y7 teachers, they should tell us so we know it is right, so we know that is the truth.”

I observed how the organic, iterative nature of the action-reflection cycle (McNiff and Whitehead, 2011) of this PAR empowered the students to create their living theory, supporting the students to revisit the five stages as needed to further explore or adapt ideas. In this example from our third meeting in iteration one, the students confidently recycled the earlier observe and reflect stages:

> (1)Renn: “So the thing is in Y6, they don’t prepare us at all. They just say ‘oh, it’s gonna be fine, it’s gonna be fine’ and that they’re gonna tell us later when we need to know but they don’t end up telling us and I am worried, like a lot of people said they were too because I don’t know what to expect and that worries me and I think really that worry would go if I just got the information.”

(1)Ana: “Yes, that’s what I think. I think we can think, what are we worrying about? And then share that with the Y7 teachers and they can do something about it, they could give us things like, like Bravo said, some homework or a map and that would, I think that would help because we can deal with the worry then, we can work on it. If we know what the homework is like then we don’t worry about it because it is a fact. And maybe the homework isn’t so bad. And if it is, then we can do something about it.”

(1)Renn and (1)Ana here seem at first to be cross talking about different issues but the process of them sharing their observations and reflections aloud with the group sparks others’ thoughts. I observed this in the second iteration when (2)SarahFawaz raised the issue of concerns over what Y7 mathematics homework will be like. The students critically engage with this issue and develop it into an action which they feel will help them and their peers:

(2)SarahFawaz: “Maybe over the holidays, they could give us some homework so we know how it is.”

(2)AbuDhabi: “I don’t think people will want extra homework in our holidays.”

(2)Student08: “I saw that homework worries people but I don’t think it will help to give us extra homework for the holidays. Maybe we can get some homework to look at but not do. I got a pack of information from my old school in Doha that I could look at but didn’t need to hand in.”

(2)AlbusDumbledore: “I think that would work. It gives us the information without extra stresses.”

The students here draw on their lived experience which is valued as part of their expertise in the living theory methodology and PAR approach. As in iteration one, the students cross referenced their own perspectives with that expressed by their peers through their response to the SAQ and mosaic methods. This supported their findings that a lack of confidence about mathematics in Y7 was a significant issue for their peers. I noted that the students did identify differing opinions and were careful not to misrepresent their peers’ views, as seen in this example of (2)Happy21’s coding of (2)Student08’s mosaic methods (Figure 14). (2)Happy21 shared her lack of confidence, stating during our discussion (2)Happy21:“I don’t feel so confident about what maths is going to be like in year 7” but did not project her own feelings onto others, as seen in her comment during her coding of (2)Student08’s response. (2)Happy21 coded the lower confidence he expressed, highlighting the graph yellow, our agreed colour code (Figure 7) for feeling unconfident. (2)Happy21 qualified this by adding a comment to state that his level of confidence about mathematics learning in Y7 was “not much less than confidence for Y6” .

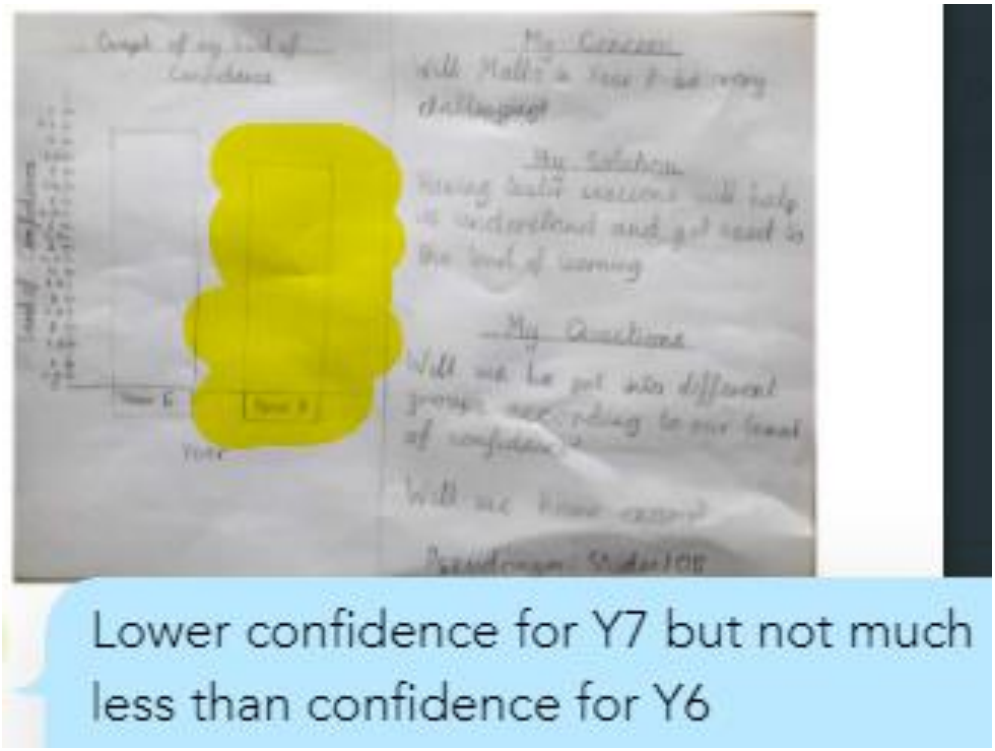


Figure 14: Identifying confidence as a relevant issue for many Y6 students. By (2)Student08 coded by (2)Happy21.

This, I argue, supports my argument that students can identify relevant issues and action solutions, if they are empowered to such as here in this research conducted with a living theory methodology. This PAR, therefore, answers the call for “diverse methodologies to elevate children’s voices and actively engage them in the production of knowledge” (Berson et al., 2019:ix).

I saw epistemological curiosity in the students evaluating the impact of their research on the transition support session. In the first iteration, I found the PAR group students

revised their view of what mathematics in Y7 will be like, showing they had co-constructed knowledge in this research.

> (1)Renn: “we are worrying for nothing and we could just be enjoying being in Y6 for the last bit of our primary school.
>
> (1)Lizzy: “I think it was good because it has stopped lots of us worrying. We have realised that it probably won’t be as bad as we thought it would be.”

The findings from iteration two similarly demonstrate how the PAR sparked the students’ epistemological curiosity as they evaluated in detail the impact of their research:

> (2)LondonEye: “I think what we did helped make the transition feel better. The teachers did what we asked for and the extra information really helped us to know what to expect and lower the worries.”
>
> (2)SarahFawaz: “I think our decisions helped Y6. It shared with the teachers what we think and they don’t know that unless we can tell them.”
>
> (2)Dr.Illuminate: “It is good that we were able to find a way to share with them.”

The final meeting to focus on how to modify the PAR for the next cohort of Y6 student researchers further supports my finding that the students identified relevant issues and actioned solutions to address these. In this extract, (1)Mia suggests altering the timing to avoid clashing with the SATS, the end of Y6 assessments, and this was fed into the second iteration of PAR. (1)Simon suggests extending the impact of PAR to students who are starting Y7 from other primary schools. This was planned for iteration two but was put on hold due to the pandemic closing schools. This modification can be actioned once we return to in school learning.

> (1)Simon: “Many of the people who are actually now in my class weren’t there during transition week. So you suddenly meet all these new people at the start of Y7. And if you’re new to BSM, you wouldn’t know anyone if you missed transition week. So it could be done at a time when more people are free.”
>
> (2)Mia: “We had a little dilemma just before transition week because it was right before our SATS so we got kinda confused and stressed about that and our SATS at the same time so it was a lot of pressure. So it shouldn’t be so close to our SATS.”

This development of living theory through the PAR is, I argue, a transformative praxis of critical pedagogy. Freire sets out the need for action, for a praxis of his theory, to create a spark of epistemological curiosity.

> It's precisely because ingenuous curiosity does not automatically become critical that one of the essential tasks of progressive educational praxis is the promotion of a curiosity that is critical, bold, and adventurous. (2001:38)

As a group, they have individual perspectives and are focusing of different aspects of the issue but in this joint space, I could see a tumbling of ideas, comments which sparked a question, observations prompting reflections which lead others to think of an action they had not yet thought of. This was a messy process but by standing back, I could see the connections at work within the group who were co-constructing knowledge about this shared transition experience.

Living theory methodology dovetails with the PAR approach to create a flexible, scaffold for students to be epistemologically empowered as experts in the research and author positive social change. McNiff and Whitehead's (2011) action-reflection cycle, is a structure which supports carving out a space within the "current epistemological hegemony" (McNiff and Whitehead, 2011:46). Freed from the banking education pedagogical expectation to find the 'right' answer or having to select from predetermined options, I have identified in existing transition research (Jindal-Snape and Cantali, 2020; O'Meara et al, 2020; Prendergast et al., 2019; TIMSS 2019, 2015, Van Rens et al., 2018; Grootenboer and Marshman, 2016; Attard, 2010; West et al., 2010), students were able to identify relevant issues and actions solutions to support their transition. Due to the iterative structure of the action-reflection cycle, they could

suggest an action and then reflect on this before putting it into effect to refine it. The nature of the group meant they could discuss together, a critical dialogue which further developed their ideas. They had freedom to articulate what is important to them and could express their thoughts and feelings in the shared, respectful space we created. Brydon-Miller (1997) states how the “development of critical consciousness takes place through repeated cycles of action and reflection” (1997:659) and I found this confirmed in the PAR findings here.

The living theory methodology gave a structure to the PAR which was accessible to all student researchers, other practitioners, and parents. This was important for creating inclusivity for all the Y6 students and I found this meant that the PAR group members represented a cross section of the year group in terms of mathematics attainment. This is not something which I formally tracked and so would be worth further exploration, but I did identify that the simplicity and clarity of the research question for the PAR, developed from Whitehead’s (2019) key question of how can I improve what I am doing? put the research into layman’s terms which avoided the need for any nuanced pedagogical understanding which may otherwise exclude some from participation.

This meant including the phrase “make maths transitions more successful” which I consciously omitted from the research question of this thesis as the term ‘successful’ in education is often associated with academic attainment. As set out in the earlier discussion of possibilities chapter, it was not the aim of this research to raise post-

transition attainment as this aim would negate the need to reject the existing pedagogy and would instead support and further entrench the hegemony I have identified as being social unjust. Instead, the research must stay focused on the social justice aim of empowering students to develop their epistemological curiosity through the process of the PAR, empowering students to understand what issues are relevant to them in their transition and to take action to put support in place to address their needs.

Freire states that both theory and praxis are needed to develop epistemological curiosity and create change, “Otherwise theory simply becomes “blah, blah, blah,” and practice, pure activism.” (Freire, 2001:30). I argue that PAR framed by critical pedagogy and living theory can create “the clasped hands of reflection/action and action/practice” (Cammarota and Fine, 2008:62) where theory and praxis “mutually illuminate each other.” (Freire, 2013:133s). This combination of theory and praxis in this PAR can be a site for the sparking of epistemological curiosity, supporting these students to have more positive primary-secondary maths transitions and creating a potential for future, wider social change. I saw this as the students here moved from passive, ingenuous curiosity to engaged, active epistemological curiosity. This is the first time such research has been conducted in this context and so these findings offer a new contribution to the field of transition research. Further, the findings have potential to contribute to an alternative approach to transition research and policy which positions students at the centre, empowered to co-construct what they need to have a supported transition and redress the current social injustices caused by unsupported transitions for many students, particularly those from lower social class.

7.4: How does sparking students' epistemological curiosity impact on their transitions?

The final indication I identified when reviewing transition literature through the critical pedagogy theoretical framework I have set out explores the impact the PAR has on students' attitudes towards their primary-secondary mathematics transitions. I drew on transition literature to understand the impact of the findings when compared to existing transitions and ask how does the PAR support change in students' attitudes towards primary-secondary maths transitions? This addresses the final research question: RQ4 What implications can we draw from the literature and this example of PAR to demonstrate the importance of epistemological curiosity and epistemological empowerment in ensuring successful transitions?

The impact on attitudes is, I argue, relevant given the long-established trend of students' attitudes towards mathematics learning declining post-transition to secondary school. TIMSS (2015) reports that the decline in students' attitudes is deepening over time with most recent reports showing more decreases than increases in students' attitudes reported globally, as seen with students' confidence declining in sixteen countries while increasing in only seven. Despite current transition research and practise, this attitude decline results in social inequalities (Hutchinson et al., 2018; Van Rens et al., 2018; Evangelou et al., 2008) with "stagnating or even worsening social mobility" (Hutchinson et al., 2018:6). I posit that if this research can positively impact on students' attitudes towards their Y7 mathematics learning, PAR can be said to be an

alternative approach to support students' primary-secondary mathematics transitions. There are other important aspects including progress and attainment and correlations with social class or gender which do warrant further attention, but which are beyond the scope of this thesis.

The findings from the SAQs and PAR group meetings were examined in depth to explore the students' attitudes and address this question. In both iterations, all students completed a SAQ in the second term of their Y6, before any transition support had been put into place and before the PAR had begun. The second SAQ was completed by all Y6 students shortly after they had completed the mathematics transition sessions. An alternative option was to complete this second SAQ following the transition to Y7 in the following September, and this approach has been used by other transition researchers (West et al., 2010) but was not adopted here as I wanted to focus in on the impact of the transition support on the Y6 students' attitudes as they approach and experience this transition.

The students self-assessed their attitudes on a scale from 1-5 across seven areas, each for Y6 and Y7, totalling fourteen areas and a possible maximum score of 70. I analysed the data from these scores and compared this with the findings from existing transition research to understand the impact of this PAR on the students' attitudes towards their primary-secondary mathematics transitions. I noted significant findings of the impact of

participation in the PAR group in two key areas which are discussed in detail next: confidence and voice.

7.4.1: Confidence

Feeling less confident about mathematics learning in Y7 was seen by the PAR group as a considerable issue for themselves and their peers. (1)Dill's comment in the reflection stage of iteration one evidences this:

> (1)Dill:"people are definitely saying they are less confident about Y7 than Y6. It goes down a lot when they answer for Y7."

In the same discussion, (1)Trinity similarly noted that "we all said we were not as confident about Y7" and (1)Shark replied "Yeh, I think that's right. It makes me feel less confident". In iteration two the students reflected how their fellow students expressed their concerns about Y7:

> (2)Happy21:"I found a lot of people are saying they're scared and worried."
>
> (2)Dr.Illuminate "Yes, I think they said what is worrying them because this was anonymous. I have never heard my friends say they are worried as much as people have said here."

These comments are supported by my analysis of the SAQ findings which show that the students in both iterations feel less confident about mathematics in Y7 prior to the transition support session. I found similar levels of confidence among the PAR and non-PAR students. There was, however, a marked difference between these two groups when the students re-assessed their confidence following the transition session. I identified an increase for all students in confidence following the transition support which implemented the PAR group's actions, but the increase was more pronounced for those students who had participated in the PAR group.

In the first cycle, there was a higher increase among PAR group students than the non-PAR group students. Since both the non-PAR and PAR group students reported very similar levels at the start, I connect the increase to the participation in the PAR. In the second iteration, the students initially felt less confident than the previous cohort and I interpret this to be linked to the change in context as this SAQ was completed in April 2020, a few weeks after the school had closed and switched to online learning due to the coronavirus pandemic. These findings echo the first iteration in showing a connection between the largest increases and participation in the PAR with the PAR group members showing a particularly significant increase in their confidence towards Y7 mathematics learning following their transition support session.

These findings, I argue, show the positive impact of active participation in the PAR on students' confidence. When cross referenced against the findings from the longitudinal, international research reported in the series of TIMSS reports (2019, 2015) and summarised in Table 1 in the thesis introduction, these findings mirror the trend of students' confidence declining due to their mathematics transition. In both cycles of PAR, the students echoed the well-established pattern (Prendergast et al., 2019, Van Rens et al., 2018, Paul, 2014, Attard, 2010) of students reporting they feel less confident about their mathematics learning in Y7 compared to Y6.

Significantly though, this decline was reduced following the PAR and the positive impact is seen most in those who actively participated in all stages of the PAR. The TIMSS (2019, 2015) data summarised in Table 1 shows a 50% decline in those students feeling most confident and a 50% increase in the students feeling least confident. The findings from the PAR show the decline was far less than that reported in TIMSS. The data is not comparative, but I am able to extrapolate the positive impact of PAR on students' confidence which breaks with the steep decline seen in other transition research (Prendergast et al., 2019, TIMSS 2019, 2015, Van Rens et al., 2018, Attard, 2010, West et al., 2010). This, I argue, has powerful potential to address the failings of existing transition research which report students' confidence becoming more "fragile" (Prendergast et al., 2019:246) and instead support students to experience a positive, confident primary-secondary mathematics transition.

I observed the impact on the students' confidence towards Y7 grow in the evaluation stage. In this extract from iteration two, (2)Rosa, (2)Unicornbanana, (2)Student08 and (2)LondonEye discussed how they felt that the transition session had put their actions into effect and this had developed the confidence for them and their peers:

> (2)Rosa:"I know my friends talked about it and said they feel happier now. They feel less worried now. Battleship and others said that they feel more confident."
>
> (2)Unicornbanana: "I do too. I feel like it won't be too much of a jump to maths in Year 7 and that we can ask the teachers for things we need and they will help us if they can."

Enjoying and "feeling confident in mathematics were strongly associated with higher average achievement" (TIMMS, 2019) and the literature review has established the importance of students' confidence in their mathematics to underpin their learning (Prendergast et al., 2019; TIMSS 2019, 2015; Van Rens et al., 2018; Attard, 2010; West et al., 2010). Students who exit primary school with low levels of confidence start secondary school with a "less than zero" (Shor, 1996:16) attitude towards their mathematics learning. Shor describes this by illustrating how students started his class with a learned preference for sitting at the back of the class, a "preference for Siberia" (1996:15). Since secondary school mathematics commonly causes concern and anxiety for students (O'Meara et al., 2020; Attard, 2010), many may start secondary school mathematics with a negative, less than zero attitude towards their mathematics

learning. The impact of this PAR to slow this decline is, therefore, a significant finding which has potential to positively impact on these students' future mathematics learning.

Further research is needed, however, to explore the longer-term impact of the PAR as students transition into Y7 and settle into mathematics learning. I earlier discussed West et al.'s (2010) critique of transition research for having to narrow a focus on the impact of transitions and while I felt it was important to look at this in the context of this research which is centred on supporting these students in their present transition, I accept that exploring the impact longer term is also valuable and warrants further attention. The TIMSS (2019, 2015) research studies students in Y9 and so it would be valuable to track these students when they start Y9 (September 2021 for iteration one and September 2022 for iteration two) to understand the longer-term impact of PAR.

7.4.2: Voice

Earlier in this thesis, I criticised the lack of transition research *by* students and this "absence of any direct consultation with the children involved in the transition" (Van Rens et al., 2018:54) has, I argue, been addressed with this PAR which I find has increased the students' sense of having a voice in their transition. In existing transition literature, "little is known about the role of children as the owners of their learning process" (Van Rens et al., 2018:44) and I set out to explore whether PAR with students as participants to co-construct their own supported transitions could redress this gap in the field of transition research. My analysis of the findings through the lens of Freirean

critical pedagogy leads me to conclude that this PAR did spark the students' epistemological curiosity and had a positive impact on their primary-secondary transition.

The students in both cycles of the PAR reported initially low levels of feeling their voice is heard in Y6 and Y7 and an increase in this feeling following the transition support in term 3. As with confidence, there was a marked increase for those students who participated in the PAR group.

The initial lower sense of having a voice reported in the SAQs was seen in the PAR group's discussion. In iteration one, our meetings were audio recorded and so the students' intonation was palpable when they discovered they had the opportunity to explore the transition for themselves and had the power to tell teachers what they wanted to happen. (1)Christopher commented, with a surprised tone:

> (1)Christopher: 'So they are going to listen to us? We get to say what we want and they will do it?'

(1)Loki commented that being listened to by teachers was a positive change:

(1)Loki: ‘Yeh, I think that’s good. It might help. It is better than just going up and we don’t know what will happen and they don’t know what we want. That won’t really help us.’

In iteration two it was not possible to capture the intonation in the students’ responses as students typed their responses in our online chat, but the students responded positively when they learned that their research findings would be shared with their Y7 mathematics teachers and the head of secondary mathematics:

(2)Dr.Illuminate: ‘That’s good he will listen and try his best to do what we ask for.’

This sense of being listened to was found to develop as we worked through the stages of PAR. Students developed an expectation of being listened to and began to challenge their teachers, suggesting the next cohort hold the teachers accountable to ensure their voices are heard. In the following extract, the PAR group in iteration two demonstrated the increased sense of having a voice which I observed in the SAQ findings:

(2)Rosa: ‘I don’t think we had the Q&A session with the maths teachers. Did we?’
(2)Smiley321:‘No but the teachers shared slides about themselves. Like their hobbies, likings etc.’

(2)Rosa: ‘I think a Q&A would have been better though. To get more time to talk to the new teachers and get to know them.’

(2)Dr.Illuminate: ‘Most of the actions we suggested were included except the Q&A. The students next time could get feedback with the math teachers first, to check everything is included.’

This was confirmed in the SAQ findings across both cohorts where students initially reported low levels of being heard. The students rated their sense of voice as lower for Y7 than Y6 and in both iterations, these levels rose following the transition support session in term 3 of Y6. The impact of the findings is, I conclude, positive. All students reported an increase in a sense of having their voice heard which, I argue, shows the positive impact of the PAR. This increase was pronounced amongst those who took part in the PAR group, showing a correlation between active participation and increase in feeling a sense of voice. The findings here concur with the reported decline in confidence and voice post transition found in existing transition literature but, I argue, offer hope for positive change. The findings show that the PAR created more supported transitions by narrowing the gap between the students’ sense of voice in Y6 and Y7 and raising their feeling of being heard overall.

I observed a cyclical effect of the PAR sparking epistemological curiosity and building empowerment which then sparked further epistemological curiosity and further developed the students’ empowerment. This development in epistemological empowerment is typified by (1)Trinity who began our research in iteration one by asking

“What do you want us to do?” and ended our final modify stage with a comment suggesting we extend the PAR to explore transition in all subject areas, assertively directly me with how to modify the next iteration and showing he now assumes that secondary school teachers will listen to the Y6 students and action what they ask for. This shows the metamorphosis of his epistemological curiosity and sense of empowerment through this PAR.

> (1)Trinity: “Next time, you should include all the subjects and make the research about everything to do with transition so they can tell all the Y7 teachers about what they might be worried about and what they want to happen to help them.”

The student researchers did spend their time and energy on this research but this, they reported had a positive impact on their attitudes towards their mathematics learning and supported them to have a more successful primary-secondary mathematics transition:

> (1)Dill: “Yeah, talking like this is really useful because we can share our ideas and we can learn more and say what we want to know, to make it, to make the transition process answer the questions which are important to us so we can make it better for each of us.”
>
> (1)Renn: “I agree with what Dill said. It is important to talk. I know it takes our time but we can think about it and the teachers will get to know what we think as

well as doing what they think is right. If we work together, I think it'll make it even better so I think we should keep doing this sort of research together."

The living theory methodology is, I argue, central to this positive change. This methodology provided the basis for the research question, the iterative action-reflection cycle structure and empowered the students' findings to be considered valid educational theory which can and should be actioned. I argue the increased sense of confidence and having a voice evidences the positive impact of this PAR; the students now feel listened to and more confident since they can action the support they need. I observed a positive compound effect when the students felt listened to they grew in confidence and then felt more empowered to ask for what they needed which increased their confidence further. The two attitudes were intertwined and developed together as the PAR progressed.

By analysing the findings of the SAQs and the student researchers' comments throughout the five stages of each iteration of PAR and comparing these with the findings of existing transition literation (Cantley et al., 2021; Jindal-Snape and Cantali, 2020; TIMSS, 2019, 2015; Van Rens et al., 2018; Paul, 2014; Attard, 2010; West et al., 2010; McGee et al. 2003; Zeedyk et al., 2003), I found that the sparking of epistemological curiosity in this PAR had a significant, positive impact on the students who participated. The impact was seen on all students across both iterations who, I found, benefitted from the additional transition support put in place in term 3 of Y6. The greatest impact was seen among the students who actively participated in all stages of

the PAR group, which supports my finding that the sparking of epistemological curiosity through the PAR can and did impact positively on students' attitudes in their primary-secondary mathematics transition.

7.5: Implications for transition research and practise.

This final section of the discussion of findings discusses the limitations of the research and implications for transition research and practise.

The positive impact of this PAR on the students' primary-secondary transition is significant, not only for the tangible increase in confidence and sense of voice which will support them in the Y7 mathematics learning and beyond but for the development in critical thinking, empowerment, sparking of epistemological curiosity which, I have argued in the discussion of possibilities chapter, has powerful potential for wider social change.

I have critiqued existing transition research (Cantley et al., 2021; Jindal-Snape and Cantali, 2020; TIMSS, 2019, 2015; Van Rens et al., 2018; Paul, 2014; Attard, 2010; West et al., 2010; McGee et al. 2003; Zeedyk et al., 2003) and discussed the need for the development of "diverse methodologies to elevate children's voices and actively engage them in the production of knowledge" (Berson et al., 2019:ix). I find that this PAR contributes to this developing area in research, supporting my view that younger students can and should be empowered to engage in developing a critical pedagogy.

Teachers and senior leaders may fear relinquishing control in the classroom, but the findings of this PAR can assuage these concerns. The students used their newfound power to support their mathematics learning. There was no revolution or chaos, it was constructive process which supported the students to develop the attitudes shown to be essential for higher levels of mathematics attainment. The living theory methodology supported the PAR being conducted with minimal disruption to the mathematics curriculum and little to no cost or other resource implication; relevant concerns for school leaders balancing ever decreasing budgets.

Sharing these points and the findings of the two iterations of PAR with school leaders in June 2020 secured support to continue with the project which is now in its third year. The primary mathematics policy (Appendix 5) has been amended to include PAR as part of our transition practise. This is, I argue, a significant impact, demonstrating that the findings of PAR built on critical pedagogy and living theory can create positive change within the existing pedagogy of schools. This has opened up discussions about extending research further into secondary school, supporting the need to explore the longer-term impact of the PAR on transitions which has the potential to support students further.

The use of living theory with students is not yet well-established within the action research community and so this research contributes to this developing field, giving an

example of how this can be conducted with positive outcomes. Additionally, I have submitted two papers (see list of publications) to two academic journals to recount this PAR and the key findings, disseminating this research with a wider audience of peers focused on developing the social justice aim of action research in education. This, I hope, offers a significant contribution to the field of knowledge.

7.6: Conclusion to discussion of findings

I found that this PAR did positively address the four questions I developed. The active participation is evidenced in the extracts which show the sparking of these students' epistemological curiosity as they explore their empowered position as co-researchers to identify relevant issues for them and action ways to support their transition. The PAR empowered students to create their own living theory and the positive impact on the students' attitudes redresses the failings of the existing transition approach (Cantley et al., 2021; Jindal-Snape and Cantali, 2020; Van Rens et al., 2018; Paul, 2014; Attard, 2010; West et al., 2010; McGee et al., 2003; Zeedyk et al., 2003). This PAR gives an example of an alternative, socially just approach which could be adopted in other schools.

This discussion addresses RQ4 What implications can we draw from the literature and this example of Participatory Action Research to demonstrate the importance of

epistemological curiosity and epistemological empowerment in ensuring successful transitions?

As students tumbled through the revolutions of the action-reflection cycle repeatedly in their PAR group meetings, I observed the sparking of their epistemological curiosity and confidence in their more empowered position. This illustrates Freire's answer to his question of how the oppressed can "carry out the pedagogy of the oppressed prior to the revolution" (1970/1993:28) through a powerful praxis of his critical pedagogy theory. The PAR here, framed by critical pedagogy and developed through a living theory methodology is found to be a transformative praxis which developed the participants' confidence and sense of voice in their Y7 mathematics learning, creating more epistemologically empowered and supported primary-secondary mathematics transitions.

Chapter 8. Conclusion

8.1: Summary of research question answers

This thesis explores the research question: how can we create more epistemologically empowered and successful primary-secondary mathematics transitions through PAR framed by critical pedagogy and living theory? I divided this into four research questions which frame the thesis.

The first research question is addressed in chapter two, establishing that there are ongoing difficulties and social inequalities resulting from this primary-secondary mathematics transition (Hutchinson et al., 2018; Van Rens et al., 2018; Evangelou et al., 2008). The second and third questions are explored in the third and fourth chapters. I identify a shared flaw of existing transitions being rooted in oppressive pedagogy, Freire's (1970/1993) banking education. From this, I concluded that an alternative approach is needed which positions students as co-constructors of knowledge, empowering them to develop epistemological curiosity to explore relevant issues in their transition and action the support they need. I set out to explore whether PAR with a living theory methodology, framed by critical pedagogy could create more supported primary-secondary mathematics transitions. The final research question is addressed in chapter seven to understand the impact of this PAR on epistemologically empowering students to create more successful transitions. I now draw conclusions from these sections, to address the overarching research question and present my argument that

PAR, framed by critical pedagogy and living theory, can create more epistemologically empowered and successful primary-secondary mathematics transitions.

A supported transition could address the reported difficulties students experience and create a successful transition. I have defined successful in this study as being found in the students' feeling confident about and a sense of their voice being heard in their mathematics learning in Y7. This definition was developed following my observation of existing transition literature reporting the ongoing decline in these key attitudes. I have established that this decline is detrimental to students' academic and personal development and that this is connected to the transition itself.

I have argued that there is no previous research to explore this transition which empowers students as co-researchers. Therefore, this research explores new territory, both theoretically and geographically, combining these three elements to explore the transitions of students in Oryx, the British curriculum school in Muscat, Oman. The findings have been presented with a discussion of the limitations and the implications for this field of research.

Situating my research in the theoretical framework of critical pedagogy answers the second research question, highlighting the lack of epistemological curiosity in the pedagogy of existing transitions as being the source of the unresolved problems and

resulting social injustice. Critical pedagogy was powerful in framing my understanding of how to create a transition praxis within the existing pedagogy of schools. Freire shaped my view that we must approach teaching as an act of critical love, respect, and hope. This grounds the positioning of students as empowered critical agents who can co-construct knowledge to support their transition. I reject the inequalities as being inevitable or normalised as a rite of passage for students. I therefore set out to explore how to overcome the oppressive pedagogy, empowering students to actively participate in the co-construction of knowledge about what the relevant issues in their transition are and how they can be supported to overcome these.

I found that this PAR of transition policy and practice was successful in introducing students to critical pedagogy and avoided the issue Shor (1996) identities when students, unfamiliar with how to exercise power resist being given authority to co-construct knowledge or use their newly empowered position to reject and disengage from mathematics learning. This is a fear I have identified anecdotally among teaching colleagues who worry that relinquishing control in the classroom will create chaos and negatively impact on students' learning.

Addressing this has meant the findings of this PAR have been implemented at Oryx effecting positive change for the two cohorts students totalling 192 children. Further, the mathematics policy has been amended to include PAR as part of the transition pedagogy at our school. This is significant, I argue, as this embeds this transformative

praxis in our pedagogy. The PAR is currently in its third year, and I am working with colleagues to extend it into secondary school, exploring the longer-term impact and into other curriculum areas to offer more support for transitioning students.

My reading led me to living theory methodology which, with its shared roots in critical theory, brought alive a transformative praxis of critical pedagogy in our PAR. This living theory methodology gave a theory to understand how the students could identify relevant issues and create actions to address these, creating their own educational theory relating to their mathematics transitions. This addressed the third research question to explore how PAR can create more epistemologically empowered and successful transitions.

When I reviewed the findings, I observed how students were able to both identify relevant issues in their transition and create actions to address these issues as they completed the PAR within the living theory methodology. Whitehead's (2019) key question of how can I improve what I am doing? and the living theory methodology supported the students to work through the five stages on PAR in an iterative way, revisiting ideas, questioning, and discussing and continuing to develop their understanding, shaping their living theory of what support they needed to have a positive start to mathematics learning in Y7. The living theory methodology was, I argue, fundamental to this development of epistemological curiosity. The cyclical, flexible

nature positioned the students as knowledgeable subjects who can co-construct knowledge and enabled students to revisit and develop ideas over time.

A further significant impact of living theory on supporting the epistemological curiosity was the structure this methodology provided to ensure that the findings can be respected and put into effect, realising the potential for social change. Freire describes the need for “methodological rigor” (2001:51) in a praxis of his critical pedagogy and, I argue, the living theory methodology in this PAR demonstrates this by supporting the students to question, explore, develop, test, and refine their ideas into an educational theory that respects them as empowered experts in their own lives who can author positive social change. This is pertinent here since the PAR is situated within the traditional pedagogy of schools which do not typically empower students to question and develop pedagogy and, secondly, since it is important that the students’ actions are put into place in their upcoming transitions, the methodology gave structure to focus our work and ensure we did come to conclusions and find solutions which were actionable.

This is fundamental if the PAR is to achieve its social justice aim of creating positive social change through more supported transitions. Social justice is the goal of PAR and so this should be woven into the PAR; ignoring this would, I ague, be an unethical abuse of my role of lead researcher as I would engineer PAR which has no possibility for benefiting the students and be a disrespectful waste of their time and energy. This would be the type of research approach I have identified and criticised in existing

transition research where students are used as a source of research data and the outcomes do not redress the social injustices they experience. As a teacher and researcher working with young people, I must be aware of my empowered position and reject any research which would “burgle their brains” (Earl, 2020, in conversation). The discussion of findings shares how our PAR meetings, whether in a classroom during lunchtime in school or after school online, we created a shared space for co-constructing knowledge between the researchers in this PAR, the adult and students.

In chapter four, I set out the limitations to PAR and that a methodology was needed to redress these issues. Van Rens et al. (2018) call for further research to empower students in transitions and Berson et al. (2019) highlight the need for the development of methodologies to elevate the voices of children. This PAR framed by critical pedagogy and living theory methodology did, I argue, address this gap in existing transition research.

Framing the PAR in living theory methodology made this PAR with students possible within our school context where I needed to be able to justify the research to the school leaders who work within the present pedagogical system. This conflict has been discussed earlier and is typified by the conflict I encountered with the ethics approach to this research. While covenantal ethics compliment that theoretical approach to this study, traditional contractual ethics had to be followed for the research to be allowed to proceed by both the university overseeing this thesis and the school in which it is undertaken.

The organic nature of living theory which McNiff and Whitehead (2011) describe is seen in this PAR as the students shape their ideas, create their knowledge, and produce their education theory, their living theory. In the ever-circling iterations of the action-reflection cycle, the intertwining of living theory and Freirean pedagogy through PAR here created critical awareness, empowerment, and social change. The iterative methodology redresses the limitations I identified of little active participation or epistemological curiosity being sparked in the observe stage of each iteration.

The living theory methodology was found to support the breaking down of pedagogical barriers with the findings supporting a decision by senior leaders to amend the primary mathematics policy to embed PAR, showing a crack in the existing oppressive pedagogy. This crack shows change is possible offers hope of further positive change being possible.

In chapter seven, I presented my argument that this PAR had a positive impact on students' attitudes of confidence and sense of voice being positively affected. This is significant for the wellbeing and academic development of the students and redresses the social inequalities presently found. The findings of this research were that at the core of the PAR, I found a connection between the key elements of critical pedagogy, living theory and the PAR itself. This addresses the final research question to

understand what impact the development of epistemological curiosity has on the students' attitudes towards mathematics learning in this transition.

I find evidence in these findings that this PAR, situated in a methodology of living theory did achieve this social justice aim. The living theory was key to this being possible as this framed this research with student participants as being a process which could create valid educational theory. This impact is twofold; it effects small-scale yet significant social change for the student participants within their present pedagogy and, secondly, sparks a possibility of revolutionary pedagogical change which has greater social justice potential. I have discussed the powerful possibility and, I argue, the cracks created here evidences this potential. I have discussed the positive impact of the PAR, both in the tangible impact on the two cohorts of students, totalling 192, but also for the potential this research has for opening up possibilities of further, wider reaching social justice.

The covenantal ethical approach of the PAR supported me to be reflexive throughout the research of students' consent and of the power imbalance. I have reflected on the tension between my role as lead researcher co-constructing the PAR with students and my position in this research as a teacher and PhD student. A way to counter this is to design an additional stage in the PAR to afford time to renegotiate the power relationships before beginning to observe. As this PAR is now part of our transition

practise, I will adopt this into the next round of research to explore if this can enhance the social justice potential of this PAR.

The findings presented here support my conclusion that developing PAR with students to explore pedagogy can support positive social change. This praxis can spark epistemological curiosity in the oppressed and work towards achieving conscientization. In this PAR, we showed how a teacher and students, both currently oppressed in different ways through the current education system, can reject banking education and establish a problem-posing model. This is change which is owned by the stakeholders, determined by their needs and wants and which can have a meaningful impact on their lives, creating social justice. PAR as a transformative practice can, I argue, offer this potential for change which can happen within the system, breaking it from within.

The sparking of epistemological curiosity found here can be developed by extending opportunities for PAR into secondary school and into other areas of pedagogy, working towards the greater goal of action research and critical pedagogy of effecting social change on a greater scale. This could, I posit, take the sparks of epistemological curiosity found here and fan these into the flames needed to create a more socially just pedagogy.

8.2 Contribution to knowledge

This research contributes new knowledge to the field of transitions, critical pedagogy, living theory and PAR. I have set out the gap in existing transition research which has not empowered students epistemologically. Berson et al. (2019) and Van Rens et al. (2018) called for further research which listened to students in this transition and the development of diverse methodologies to elevate children voices and, I argue, this thesis has answered this. This PAR is an example of how young ten- and eleven-year-old students seized the opportunity with maturity and articulated their needs and found effective solutions to these. This confirms my view of students' capabilities from my experience teaching students. I hope this can be emulated in other schools to explore how pedagogy can be changed within the current education system, sparking further social justice.

In my research, I observed the significance of the combination of the three elements in this research; critical pedagogy, living theory and PAR. I found that each element had a critical role in the research findings. Through the lens of Freirean critical pedagogy, I understood the importance of active participation in sparking epistemological curiosity and explaining the finding that the PAR group members reported much higher positive impact on their attitudes. The living theory methodology resulted in the students being able to identify relevant issues and action these to create more supported transitions. The PAR was the conduit for these theories and the findings show that the PAR group members did create more supported transitions. Each element is itself was powerful

but, I argue, when they converged in this research, this created the crucible for social change.

Critical pedagogy developed my understanding of the difficulties I had observed the Y6 students experiencing, an observation which had sparked this exploration of the mathematics transition. This theory highlighted the pedagogy at the heart of the transition as needing further examination. Having understood the limitations in the existing transition approach, living theory methodology and PAR gave me the means to explore an alternative which could possibly support the Y6 students more in the upcoming transition. It is the combination of these three aspects intertwined together which supported me and which I observed to be powerful for underpinning the positive outcomes of this PAR.

This overlap between critical pedagogy, living theory and PAR is, I believe, significant. If one of these three elements were removed, this PAR would not have had positive social justice impact. Without critical pedagogy there would be no understanding of the pedagogy behind transition research and practice, without living theory the research would not be grounded in a methodology to support a transformative praxis of critical pedagogy and without PAR, the students would have no means to explore and execute more supported transitions. If any one of the three elements were removed, the positive change found when reviewing the two cycles of PAR would not, I argue, have happened and these students would have begun their Y7 mathematics learning with less confidence and less sense of being heard and supported. Instead, the barriers were

removed through this PAR framed by critical pedagogy and living theory and the students were empowered to be their own heroes, their own example in how to navigate the challenges and author their own successful primary-secondary mathematics transition. The convergence of the three elements of critical pedagogy, living theory and PAR supporting these students in Muscat is, therefore, a powerful force for social change. I term this powerful trio the Three Muscateers, a modern-day version of the Three Musketeers fighting for social justice.

As it is the very obvious truth that the oppressed must be their own example, it is also seen to be true that these young students can understand relevant issues and articulate what they needed. They challenged each other in critical dialogue, exploring and reflecting, refining, and developing their living theory of supported transitions. As they tumbled through the iterations of the action-reflection cycle, these ten- and eleven-year-old students found ways to support this transition for themselves and others which had a positive impact, reducing the reported decline in confidence and sense of voice and giving these students a more positive start to Y7 mathematics learning. An ontological position, inspired by Freire, of critical love, respect and hope grounded me in a belief that these students could develop their epistemological curiosity to effect meaningful, positive social change. These students were their own example in this, their own heroes. Renegotiating the power imbalance created a crack for these students to seize epistemological power and forge social change. The findings deepen and widen this crack by showing that these young students can develop epistemological curiosity and that a transformative praxis of critical pedagogy can occur with our schools. The scale

of this change is small yet significant, empowering these students to feel confident and heard as they start Y7. This answered the core research of this study, exploring how we can create more epistemologically empowered and successful primary-secondary mathematics transitions through PAR framed by critical pedagogy and living theory.

8.3 Limitations

This PAR forms my PhD thesis and so I designed the research and set and monitored deadlines. The role of lead researcher is deemed necessary in PAR (Jolicoeur et al., 2019) and Freire supports this role by describing how striving for an equity between teachers and students does not 'diminish the need for explanation and exposition' (2001:81) from teachers. In this case where no existing research by students has been conducted, it was, I believe, necessary for me to instigate the PAR by establishing the research design and communicating between students and other teachers to implement their actions. I do, however, acknowledge that future PAR would be enhanced by a reduced role by the lead researcher to further develop the empowerment of students to self-determine the direction of their research; I hope this PAR provides a foundation for this.

I have noted that in the earliest stage of the first iteration of PAR, my voice dominated the dialogue as my lack of experience and confidence led to me acting as an inadvertent nervous filibuster. I reflected on this and prompted myself to be reflexive (Warin, 2011) and consciously renegotiate and share epistemological power. I was able to amend my role and create space for the students to speak and be heard. As the

stages of PAR progressed, I found evidence of my role becoming more of a facilitator in the research as the students' active participation grew and their agentic voice and epistemological curiosity developed. This also, I feel, reflects the extent to which myself and the students are entrenched in the present pedagogy and while others (Shor, 1996) have expressed similar challenges and I observed how the second iteration chipped away at the cracks and I hope as PAR is embedded in our transition practice, the students' voices and agency will be further elevated. I have reflected that it would be constructive to adapt the research design to include additional meetings to enable the renegotiation of power from banking education towards a problem posing model to take place. This would, I argue, support the empowerment of students from the first stage and develop the potential of PAR.

I am aware of my positionality as lead researcher and doctoral student and acknowledge that bias is impossible to completely irradicate. Organising the findings by the questions I interrogated existing transition literature against, supported me to critically examine the findings and be reflective. Being open to learning and acknowledging my limitations helped me to be reflexive of my position.

While my role as lead researcher created issues of power imbalance, I also observed that my positionality in the research as a teacher had a positive impact in establishing the ontological values at the heart of this PAR. The critical love, hope and respect I hold for students sparked my initial desire to explore this since I could see the students were having difficulties and I cared that this was affecting their emotional and academic

development. PAR was selected as a research approach as this respected the students' capacity to create their own social change. Running through this was a hope that this could have a positive outcome and there was nothing to fear from distributing power with students. The time spent researching with the students was full of love, respect, hope and was also lots of fun.

A further limitation is low participation in the PAR, with nineteen out of 192 students completing all five stages. Increasing active participation while honouring the covenantal ethics (Brydon-Miller, 2009) approach is a challenge and a solution may be building the PAR into their mathematics lessons in school time. This could enable participation from all students without taxing their free time. The third cycle of PAR is ongoing at present, and this has proven to be another turbulent year with some periods of the year online. It is my hope that once we can return to being in school, we can fully explore the potential for wider active participation by embedding the PAR into mathematics lessons, sparking epistemological curiosity for more students, and further supporting this transition.

The social injustice I identified in the transition experience, with those from lower social class experiencing more significant declines in confidence and attainment, has not been explored. This is not a failing of the research per se but reflects the context of Oryx, a British curriculum school in Muscat attended by expatriate students, most of whose parents have professional jobs and all of whom pay fees to attend. Further research is needed to observe the longer-term impact and explore connections to attainment,

gender, ethnicity, and social class and provide valuable information which could redress the present social injustice in the primary-secondary mathematics transition. I hope the findings will support other teachers to feel more confident sharing epistemological power with their students, enabling PAR projects to flourish at Oryx and other schools, underpinning the social justice potential I have found here and further exploring and supporting transitions.

8.4 Next steps

The PAR is currently in its third year at Oryx and my next steps are focused on completing this with the student researchers, meeting them in their second term of Y7 in February 2022. As we meet to modify the PAR and handover to the next cohort, I will also hand this PAR over to a Y6 teacher to step into the role as lead researcher. This, I hope, will ensure that PAR is deeply embedded into our transition practice and is not reliant on my direct involvement.

I return to teaching in the Y1 and, armed with my weaponised love and critical hope and my understanding of critical pedagogy from Freire, I will revisit the focus of my earlier research, the transition from the end of the EYFS into Y1. I will establish PAR with these four-and five-year old students, empowering them to explore this transition.

I will also continue to work with colleagues in Oryx secondary school to explore the possibility we have discussed of extending PAR with the first cohort who will be starting

Y9. This aims to understand the longer-term impact of the transitions and build on our praxis of critical pedagogy in their mathematics learning, empowering them to have greater voice and confidence. This, I hope, has the potential to extend beyond mathematics into other areas and territories, including Oryx's sister school in the south of Oman and across borders into other schools internationally.

This thesis concludes that PAR with young students as critical agents actively participating in a transformative praxis of critical pedagogy to create living theory can and should be developed further. It is my hope that others will emulate and extend this in their own myriad contexts to effect meaningful positive social change.

Appendices

Appendix 1: Oryx Mathematics Policy 2019

5. Links between FS, KS1, KS2 and KS3

5.1 In Term 3, all teachers will be involved in transition meetings where pastoral and academic information is discussed and passed to the new teacher for the following year.

5.2 Towards the end of Term 3, the Year 6 children will have taster lessons in the Senior School. Year 7 teachers will meet with the Year 6 teachers to discuss the children's placement in their current fluid group and their Learning Ladders data to see which (if any) children may benefit from being moved to a different group.

5.3 All SATS Mathematics data will be passed onto the Senior School as soon as it is available to enable them to make final decisions as regards placement of children in groups. By the end of Term 1, a Year 7 teacher will feed back to Year 6 staff on the progress of individual children – particularly any concerns. Year 6 teachers will then have the opportunity to suggest particular strategies which may have helped maximise that child's learning.

5.3 The Year 7 teachers will also identify any particular gaps in children's learning which may inform the planning of the Year 6 teachers for subsequent years. Year 7 teachers will take prior learning into account by looking at Teacher Assessments and SAT's results.

5.4 Opportunities for children to work across phases to help develop Mastery e.g. children being the leader/teacher in a role play scenario such as shopping at the Souq.

Appendix 2: Self-Assessment Questionnaire (SAQ)

Pseudonym……

Please circle one number per question to best describe how you identify yourself.

How **confident** do you feel about your maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How **confident** do you feel about your maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How **resilient** are you when facing a difficulty in your maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How **resilient** are you when thinking about facing a difficulty in your maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How **motivated** are you by your maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How **motivated** are you when thinking about your maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you **enjoy** maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you think you will **enjoy** maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you feel you **have a voice** in your maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you think you feel you will **have a voice** in your maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you feel you are **supported** in maths learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much do you think you feel you will be **supported** in your maths learning in Year 7?

1	2	3	4	5
Very low	Low	Medium	High	Very high

How much **responsibility** do you have over maths teaching and learning in Year 6?

1	2	3	4	5
Very low	Low	Medium	High	Very high

Appendix 3*:* Participant Information Sheet

Participant Information Sheet

Name of Project: An exploration of participation action research with students to support the transition in mathematics between our primary and senior schools.

Researcher: Jo Matiti

Dear Year 6 student,

I would like to invite you to take part in a research study which is part of my PhD studies in the Department of Educational Research at the University of Lancaster. Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Talk to others about the study if you wish. Ask me if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?
This is a research project to find out how we can support students in their transition in mathematics between primary and senior schools at BSM. I want to find out if we can improve students' experiences of their transition by including them in the transition process.

Why have I been invited?
Since this transition affects students most, I want to speak to you to understand how you feel about what it is important to you in the upcoming transition, specifically thinking about the move to maths in senior school. I will give you an opportunity to have your say in what we do in the transition week maths lessons and you can create changes which will, hopefully, improve your transition.
If you choose to take part, I will ask you to complete a questionnaire. You are also invited to also take part in a focus group session where we sit and talk about your transition in maths.

Do I have to take part?
You do not have to take part. Your participation is voluntary and you can withdraw at any time during the questionnaires or focus group sessions. Once I have collected the data, it will be used for the research, even if you no longer wish to take part in the rest of the project.

What will taking part involve for me?
Outline:

- Completing a questionnaire before and after your transition support session in in term 3.
- Taking part in a focus group to talk about this transition.
- Share your thoughts and feelings. Being open and honest with me so I can better understand your experiences of this maths transition.
- Meeting to analyse the data collected.
- Using our findings and analysis to help plan the transition week maths lessons.
- Each meeting will take approximately 30 minutes. I will use our lunchbreaks so we can share lunch while we collect and analyse the data and still have time at break for play and relaxation.
- We will share the data collected in our conversations and discuss what it means and what we can do with it to improve our mathematics transitions. I will share the final findings with you once I have finished the project (approximately September 2021).
- I will share it with my University, including their data depository, but all will use your pseudonym so your responses will be anonymous.

What will I have to do?
If you agree, I will ask your parents to sign a consent form to give their consent. I will arrange dates for us to meet during our lunchbreaks.

What are the possible benefits of taking part?
By taking part, you have the opportunity to express your own thoughts and feelings and help to develop school policy which has potential impact on you and other students in the future. You will get to have your voice heard and will develop your confidence in working collaboratively with others.

If you would like to take part, please complete the reply slip below and return to your Year 6 teacher.

Thank you for your time,

Mrs Matiti
Year 6 Teacher

Glossary

Focus group
A group of people who participate in a discussion to provide feedback.

Analyse
To examine the information carefully.

Confidential
Keeping information private.

Consent
Agreement or permission to take part in this research study.

Data
Data is pieces of information. In this study, the data is the information students share about their experiences of their transition in maths to BSM senior school.

Data depository
This is a store for data at Lancaster University in England. The information is kept securely and can be shared by others who are interested in similar research. All data is anonymous to protect the confidentiality of the participants.

Participants
Participants are those who choose to take part in this research.

Pseudonym
This is a false name participants can choose for themselves and will be used in the publication of the research so that the real name of participants is kept confidential.

Questionnaire
A set of questions asked to collect information.

Transition in maths
In this example, it is the move from learning maths in primary school in Year 6 to senior school in Year 7.

Appendix 4: Consent Form

Research Consent Form

Title of Project: An exploration of participation action research with students to support the transition in mathematics between our primary and senior schools.

Name of Researcher: Jo Matiti

Please read the participant information and, if you would like to take part in the research, complete this consent form and return it to your Year 6 teacher. Students should complete section A and parent(s) complete section B.

Section A: Student participants:

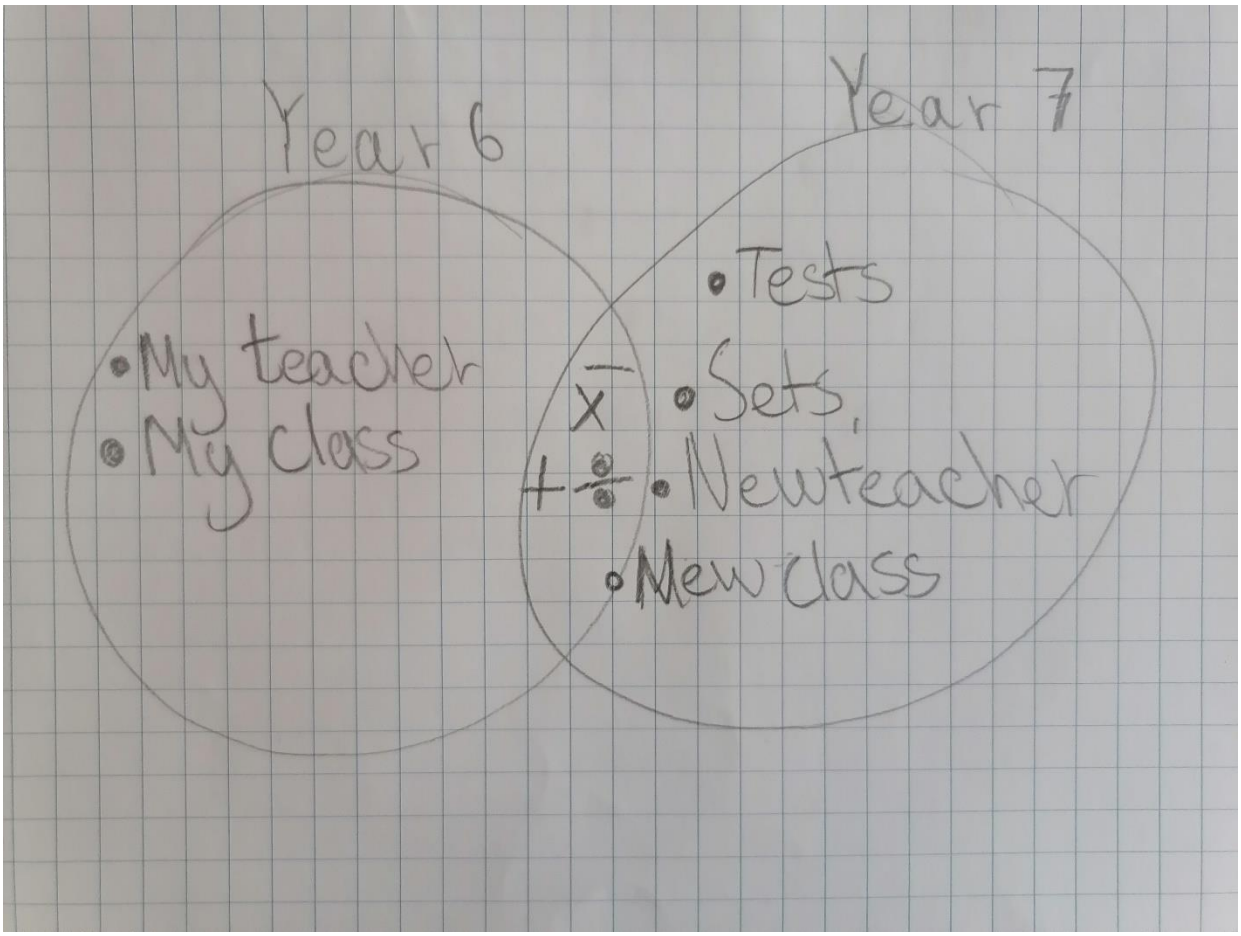
Name of Student Participant……..……..Class……	Participant Initials
1. I confirm that I have read and understand the participant information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.	
3. I consent to the interviews/sessions being audio-recorded.	
4. I agree to take part in the above study.	

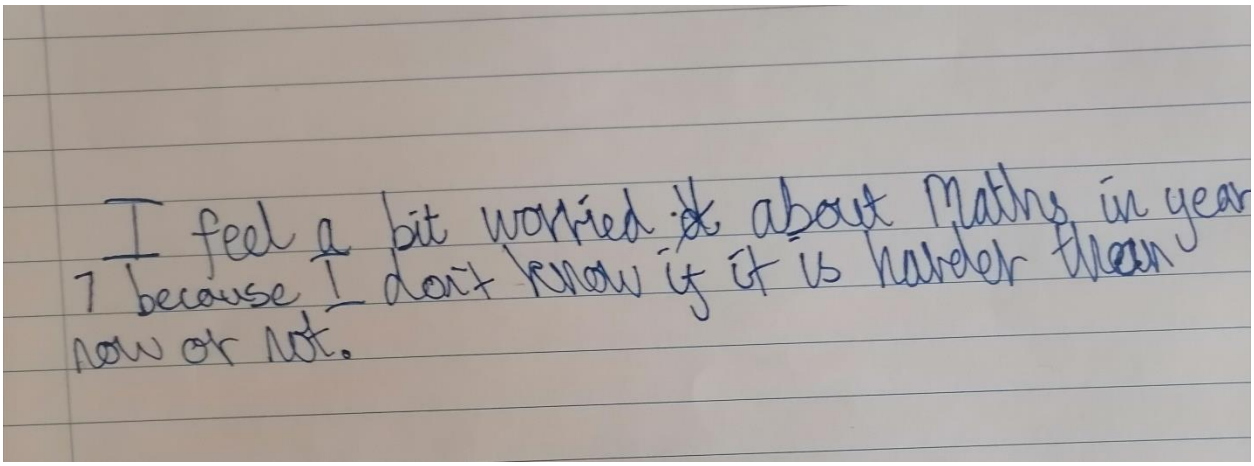
Section B: Parent(s)

Name of Parent……..……..Date ……..…

Signature of Parent…… ……..……..…

Appendix 5: Examples of Data Collected Using Mosaic Methods in Iteration One





Appendix 6: Oryx Mathematics Policy 2020

5. Links between FS, KS1, KS2 and KS3

5.1 In Term 3, all teachers will be involved in transition meetings where pastoral and academic information is discussed and passed to the new teacher for the following year. Teams overseeing key transition points (FS2 to Y1, Y2 to Y3) meet together and schedule a range of transition opportunities, such as pupil observations, collaborative book reviews and Pupil Progress Meetings.

5.2 All Year 6 children will be consulted about their transition to senior school maths during Term 3 as part of an ongoing research project. Their responses will be used to inform the planning of the transition week later in Term 3.

5.3 Towards the end of Term 3, the Year 6 children will have taster lessons in the Senior School. Year 7 teachers will meet with the Year 6 teachers to discuss the children's placement in their current fluid group and their Learning Ladders data to see which (if any) children may benefit from being moved to a different group.

5.4 All Mathematics data will be passed onto the Senior School as soon as it is available to enable them to make final decisions as regards placement of children in groups. By the end of Term 1, a teacher will feed back to staff from the year below on the progress of individual children – particularly any concerns. All teachers will then have the opportunity to suggest particular strategies which may have helped maximise that child's learning.

References

Adelman, C., 1993. Kurt Lewin and the origins of action research. *Educational action research*, *1*(1):7-24.

Amsler, S., 2017. *The education of radical democracy*. Routledge.

Amsler, S., 2013. In Cowden, S., Singh, G., Amsler, S., Canaan, J. E, and Motta, S. *Acts of knowing critical pedagogy in, against and beyond the university*. New York: Bloomsbury Academic.

Anderson, L. W, Jacobs, J., Schramm, S., and Splittgerber, F., 2000. School transitions: Beginning of the end or a new beginning? *International Journal of Educational Research, 33*(4), 325-339.

Apple, M.W., Au, W. and Gandin, L.A. eds., 2009. *The Routledge international handbook of critical education*. Taylor and Francis.

Aronowitz, S., 2001. In Freire, P. *Pedagogy of freedom: ethics, democracy and civic courage.* Rowan and Littlefield.

Ashton, R., 2008. Improving the transfer to secondary school: How every child's voice can matter. *Support for Learning, 23*(4): 176-182.

Aslan-Tutak, F., Bondy, E., & Adams, T., 2011. Critical pedagogy for critical mathematics education. *International Journal of Mathematical Education in Science and Technology, 42*(1): 65-74.

Attard, C., 2013. “If I had to pick any subject, it wouldn’t be maths”: Foundations for engagement with mathematics during the middle years. *Mathematics Education Research Journal, 25*(4): 569-587.

Attard, C., 2010. Students' Experiences of Mathematics during the Transition from Primary to Secondary School. *Mathematics Education Research Group of Australasia*.

Beck, U., 2009. *World at risk* (English ed.). Cambridge; Malden, Massachusetts: Polity.

Berson, I.R., Berson, M.J. and Gray, C. eds., 2019. *Participatory Methodologies to Elevate Children's Voice and Agency*. IAP.

Bharara, G., 2020. Factors facilitating a positive transition to secondary school: A systematic

Black, L., Williams, J., Hernandez-Martinez, P., Davis, P., Pampaka, M. and Wake, G., 2010. Developing a 'leading identity': The relationship between students' mathematical identities and their career and higher education aspirations. *Educational Studies in Mathematics*, *73*(1):55-72.

Blackburn, J., 2009. Listening to the children's voices to understand how better to support their transitions from Reception to Year One. Master's degree dissertation. Institute of Education Library, University of London.

Bloch, E., Plaice, N., Plaice, S. and Knight, P., 1986. *The principle of hope* (3): 514-15. Cambridge, MA: mit Press.

Brady, J., 1994. In Lankshear, C. and McLaren, P. (Eds) *The Politics of Liberation*. Routledge.

British Education Research Association (BERA), 2018. Ethical Guidelines for Educational Research, fourth edition https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018

Brown, M., Brown, P. and Bibby, T., 2008. “I would rather die”: reasons given by 16-year-olds for not continuing their study of mathematics. *Research in mathematics education*, 10(1):3-18.

Bru, E., Stornes, T., Munthe, E. and Thuen, E., 2010. Students' perceptions of teacher support across the transition from primary to secondary school. *Scandinavian Journal of Educational Research*, *54*(6): 519-533.

Brydon-Miller, M. 2009. In Mertens, D and Ginsberg, P. Covenantal Ethics and Action Research: Exploring a Common Foundation for Social Research. In *The Handbook of Social Research Ethics* (p. 243). Thousand Oaks: SAGE Publications.

Brydon-Miller, M. (1997). Participatory Action Research: Psychology and Social Change. *Journal of Social Issues, 53*(4): 657-666.

Bryman, A., 2016. *Social research methods* Oxford: Oxford University Press

Bloch, E., Plaice, N., Plaice, S. and Knight, P., 1986. *The principle of hope* (3): 514-15). Cambridge, MA.

Bru, E., Stornes, T., Munthe, E. and Thuen, E., 2010. Students' perceptions of teacher support across the transition from primary to secondary school. *Scandinavian Journal of Educational Research*, *54*(6):519-533.

Cammarota, J. and Fine, M., 2008. *Revolutionizing education youth participatory action research in motion*, New York: Routledge.

Cantley, I., O'Meara, N., Prendergast, M., Harbison, L., and O'Hara, C., 2021. Framework for analysing continuity in students' learning experiences during primary to secondary transition in mathematics. *Irish Educational Studies,* 1-13.

Carson, T. R., and Sumara, D. (Eds), 1997. *Action research as a living practice.* Peter Lang Publishing Inc.

Chambers, G., 2019. Pupils' perceptions of Key Stage 2 to Key Stage 3 transition in modern foreign languages. *The Language Learning Journal*, *47*(1):19-33.

Chaudhary, A., 1997. In McTaggart, (Ed.). *Participatory Action Research: International Contexts and Consequences*, State University of New York Press, State University Plaza, Albany NY.

Chedzoy, S.M. and Burden, R.L., 2005. Making the move: Assessing student attitudes to primary-secondary school transfer. *Research in education*, *74*(1):.22-35.

Clark, A. and Moss, P., 2011. *Listening to young children the Mosaic approach* 2nd ed., London: NBC (National Children's Bureau).

Clark, A. and Statham, J., 2005. Listening to Young Children: Experts in Their Own Lives. *Adoption and Fostering*, 29(1):45–56.

Coad, J. and Evans, R., 2008. Reflections on Practical Approaches to Involving Children and Young People in the Data Analysis Process. *Children and Society*, 22(1):41–52.

Coffey, A., 2013. Relationships: The key to successful transition from primary to secondary school? *Improving Schools*, *16*(3):261-271.

Coghlan, D. and Brydon-Miller, M. eds., 2014. *The SAGE encyclopedia of action research*. Sage.

Darder, A., 2018. *The student guide to Freire's pedagogy of the oppressed.* London: Bloomsbury.

Darder, A., 2017a. *Reinventing Paulo Freire: A pedagogy of love*. Taylor and Francis.

Darder, A., Baltodano, Marta, and Torres, Rodolfo D., 2017b. *The critical pedagogy reader* (2nd ed.). New York, NY: Routledge.

Duncan-Andrade, J.M. and Morrell, E., 2008. Youth Participatory Action Research as Critical Pedagogy. *Counterpoints*, 285:105–131.

Eagleton, T., 2011. *Literary Theory*. Minnesota: Wiley-Blackwell

Earl, C., 2020. *In conversation.* University of Lancaster. UK.

Earl, C., 2015. Making hope possible: an exploration of moving popular pedagogy forward in neoliberal times from the streets to the university. *Journal for Critical Education Policy Studies*, *12*(3):1-43.

Early Years Foundation Stage statutory framework., 2021. https://www.gov.uk/government/publications/early-years-foundation-stage-framework--2

Ellsworth, E., 1989. Why Doesn't This Feel Empowering? Working through the Repressive Myths of Critical Pedagogy. *Harvard Educational Review, 59*(3): 297-324.

Evangelou, M., Taggart, B., Sylva, K., Melhuish, E., Sammons, P. and Siraj-Blatchford, I., 2008. Effective pre-school, primary and secondary education 3-14 project (EPPSE 3-14): what makes a successful transition from primary to secondary school?

Fabian and Huber, 2019. in Berson, I.R., Berson, M.J. and Gray, C. Eds. *Participatory Methodologies to Elevate Children's Voice and Agency*. IAP.

Fenge, L.-A., 2010. Striving towards Inclusive Research: An Example of Participatory Action Research with Older Lesbians and Gay Men. *British Journal of Social Work*, 40(3):878–894.

Fernández-Aballí Altamirano, A., Da Rocha, I. and Obradors, M., 2015. Moving towards Freirean Critical Pedagogy: Redefining Competence-based Curricula through Participatory Action Research as Resistance to the Neoliberalization of Higher Education in Spain. *Oxímora. Revista Internacional de Ética y Política*, (6): 1–26.

Fontana, B., 2008. In Howson, R., and Smith, K. *Hegemony : Studies in consensus and coercion* (Routledge studies in social and political thought ; 56). New York: Routledge.

Foy, R., 1971. Review of Pedagogy of the Oppressed. *Educational Studies*, (2):3-4.

Freire, P., 2019. *Pedagogy of Hope: Reliving Pedagogy of the Oppressed.* Bloomsbury Revelations: London

Freire, P., 2018. *Teachers as cultural workers: Letters to those who dare teach*. Routledge.

Freire, P., 2013. *Education for critical consciousness* (Bloomsbury revelations). London, England: Bloomsbury.

Freire, P., 2005. *Teachers as cultural workers: Letters to those who dare teach*. Routledge.

Freire, P., 2001. *Pedagogy of freedom: ethics, democracy and civic courage.* Rowan and Littlefield.

Freire, P., 1998. Cultural action and conscientization. *Harvard Educational Review, 68*(4): 499-521.

Freire, P., 1970/1993. *Pedagogy of the oppressed* Penguin

Freire, P., 1971. To the coordinator of a" cultural circle". *Convergence*, *4*(1)

Freire, P., Leonard, P., and McLaren, P., 1992. *Paulo Freire A Critical Encounter*. London: Routledge.

Gatto, J., 1977/2010. *Weapons of Mass Instruction: A Schoolteacher's Journey Through the Dark World of Compulsory Schooling.* Gabriola Island: New Society.

Gillett-Swan, J.K. and Sargeant, J., 2018. Unintentional power plays: Interpersonal contextual impacts in child-centred participatory research. *Educational Research*, *60*(1):1-16.

Giroux, H., 2018. *On Critical Pedagogy*. Bloomsbury.

Giroux, H., 2005. *Border crossings cultural workers and the politics of education* (2nd ed.). New York: Routledge.

Giroux, H., 1992. In Freire, P., Leonard, P., and McLaren, P. *Paulo Freire A Critical Encounter*. London: Routledge.

Gramsci, A., 1971. *Selections from the prison notebooks of Antonio Gramsci*. Ed. And trans Hoare, Q. and Nowell-Smith, G. London: Lawrence and Wishart.

Gray, C. and Winter, E., 2011. Hearing voices: participatory research with preschool children with and without disabilities. *European Early Childhood Education Research Journal*, 19(3): 309–320

Groundwater-Smith, S. and Mockler, N., 2019. In Berson, I.R., Berson, M.J. and Gray, C. eds. *Participatory Methodologies to Elevate Children's Voice and Agency*. IAP.

Grootenboer, P. and Marshman, M., 2016. Changes in Affective Responses to Mathematics Through the Middle School Years. In *Mathematics, Affect and Learning* (pp. 91-110). Springer, Singapore.

Gutstein, E., 2012. *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Routledge.

Harber, C., 2004. *Schooling as violence how schools harm pupils and societies*. London: RoutledgeFalmer.

Heinsch, M., Agllias, K., Sampson, D., Howard, A., Blakemore, T., and Cootes, H., 2020. Peer connectedness during the transition to secondary school: A collaborative opportunity for education and social work. *Australian Educational Researcher, 47*(2), 339-356.

Holloway, J., 2010. *Crack Capitalism.* London: Pluto Press.

hooks, b., 2017. In Darder, A., Baltodano, Marta, and Torres, Rodolfo D. *The critical pedagogy reader* (2nd ed.). New York, NY: Routledge.

hooks, b., 2003. *Teaching community: A pedagogy of hope*. New York: Routledge.

hooks, b., 2001. *All about love: New visions* (First Perennial ed.). New York: Harper Perennial.

hooks, b., 1994. *Teaching to transgress: Education as the practice of freedom*. New York: Routledge.

hooks, b., 1992. In Freire, P., Leonard, P., & McLaren, P. *Paulo Freire A Critical Encounter*. London: Routledge.

Howe, A., and Richards, V., 2011. *Bridging the transition from primary to secondary school*. London

Hughes, L., Banks, P., and Terras, M., 2013. Secondary school transition for children with special educational needs: A literature review. *Support for Learning, 28*(1): 24-34.

Hutchinson, J., Robinson, D., Carr, D., Hunt, E., Crenna-Jennings, W. and Akhal, A., 2018. Education in England: annual report 2018. Education Policy Institute. https://epi.org.uk/publications-and-research/annual-report-2018/

Jindal-Snape, D., and Cantali, D., 2020. A four-stage longitudinal study exploring pupils' experiences, preparation and support systems during primary–secondary school transitions. *British Educational Research Journal, 45*(6), 1255-1278.

Jolicoeur in Berson, I. R., Berson, M. J., Gray, C. (Eds), 2019. Participatory Methodologies to elevate children's voice and agency. Information Age Publishing. Charlotte, NC.

Kokka, K., 2020. Social Justice Pedagogy for Whom? Developing Privileged Students' Critical Mathematics Consciousness. *The Urban Review, 52*(4): 778-803.

Lewin, K., 1946. Action Research and Minority Problems. *Journal of Social Issues*, 2(4):34–46.

Levitas, R., 1990. Educated hope: Ernst Bloch on abstract and concrete utopia. *Utopian Studies*, *1*(2), pp.13-26.

Lorde, A., 2013. The master's tools will never dismantle the master's house. In *Feminist Postcolonial Theory a Reader* (pp. 25-28). Taylor and Francis.

Lucey, H. and Reay, D., 2000. Identities in transition: Anxiety and excitement in the move to secondary school. *Oxford Review of Education*, *26*(2): 191-205.

MacDonald, C. 2012 Understanding participatory action research: A qualitative research methodology option The Canadian Journal of Action Research 13 (2):34-50

Marsh, H., 1986. Verbal and math self concepts: An internal external frame of reference model. *American Educational Research Journal, 23*(1): 129-149.

Martínez Gómez, G.I., 2015. La filosofía de la educación de Paulo Freire. *Revista Internacional de Educación para la Justicia Social*.

McArthur, J., 2021. Critical theory in a decolonial age. *Educational Philosophy and Theory*. 1-12.

McGee, C., Ward, R., Gibbons, J. and Harlow, A., (2003). Transition to secondary school: A literature review. *A Report to the Ministry of Education. Hamilton, University of Waikato, New Zealand*.

McIntyre, A., 2008. *Participatory action research*, Los Angeles, Calif.; London: SAGE.

McLaren, P., 2017. In Darder, A., Baltodano, Marta, and Torres, Rodolfo D. *The critical pedagogy reader* (2nd ed.). New York, NY: Routledge.

McLaren, P., 2004. In Steiner, S. et al. (Eds) *Freireian Pedagogy, Praxis, and Possibilities: Projects for the New Millennium.* CT: Routledge.

McLaren, P. and Da Silva, T., 1992. In Freire, P., Leonard, Peter, and McLaren, Peter. *Paulo Freire A Critical Encounter*. London: Routledge.

McNiff, J., 2017. *Action research all you need to know.* SAGE Publications Ltd

McNiff, J. and Whitehead, J., 2011. *All you need to know about action research*, 2nd edition. SAGE Publications.

McTaggart, R.E., 1991. *Participatory Action Research: International Contexts and Consequences*, State University of New York Press, State University Plaza, Albany NY.

Miles M. B. and Huberman, A. M. 1994 *Qualitative Data Analysis: An Expanded Sourcebook* Thousand Oaks: Sage

National Curriculum for England. 2014. Department for Education. https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum

Neal, S, Rice, F, Ng-Knight, T, Riglin, L, and Frederickson, N., 2016. Exploring the longitudinal association between interventions to support the transition to secondary school and child anxiety. *Journal of Adolescence (London, England.), 50*: 31-43.

Oftsed, 2021. Education inspection framework. https://www.gov.uk/government/collections/education-inspection-framework

O'Meara, N., Prendergast, M., Cantley, I., Harbison, L., and O'Hara, C., 2020. Teachers' self-perceptions of mathematical knowledge for teaching at the transition between primary and post-primary school. *International Journal of Mathematical Education in Science and Technology, 51*(4), 497-519.

Pant, M. 2014 in Coghlan, D., & Brydon-Miller, M. *The SAGE encyclopedia of action research*. London: SAGE Publications.

Paul, M., 2014. Managing the transition from primary school mathematics to secondary school mathematics: Teachers' and learners' perspectives. *Mediterranean Journal of Social Sciences, 5*(25), 205-215.

Plato, 2017. *Laches*, Project Gutenberg.

Prendergast, M., O'Meara, N., O'Hara, C., Harbison, L. and Cantley, I., 2019. Bridging the primary to secondary school mathematics divide: Teachers' perspectives. *Issues in Educational Research*, *29*(1):243-260.

Radovic, D., Black, L., Williams, J. and Salas, C.E., 2018. Towards conceptual coherence in the research on mathematics learner identity: A systematic review of the literature. *Educational Studies in Mathematics*, *99*(1): 21-42.

Reay, D., 2012. What would a socially just education system look like?: Saving the minnows from the pike. *Journal of Education Policy, 27*(5): 587-599.

Reay, D., 2006. The zombie stalking English schools: social class and educational inequality. *British Journal of Educational Studies, 54*(3): 288-307.

Reason, P. and Bradbury, H., 2008. *The SAGE handbook of action research: participative inquiry and practice* 2nd ed., Los Angeles, London: SAGE.

Rice, F., Frederickson, N. and Seymour, J., 2011. Assessing pupil concerns about transition to secondary school. *British Journal of Educational Psychology*, *81*(2):244-263.

Rigby, C., 2017. Exploring students' perceptions and experiences of the transition between GCSE and AS Level mathematics. *Research Papers in Education*, *32*(4):501-517.

Riley, D. J., 2011. Hegemony, Democracy, and Passive Revolution in Gramsci's Prison Notebooks. *California Italian Studies, 2*(2), 22.

Sanders, D., White, G., Burge, B., Sharp, C., Eames, A., McEune, R. and Grayson, H., 2005. *A Study of the Transition from the Foundation Stage to Key Stage 1. Research Report: SSU/2005/FR/013*. National Foundation for Educational Research. UK.

Shor, I., 1996. *When Students Have Power : Negotiating Authority in a Critical Pedagogy.* Chicago, IL: University of Chicago Press.

Shor, I., and Freire, P., 1987. *A pedagogy for liberation : Dialogues on transforming education*. South Hadley, Mass.: Bergin and Garvey.

Stern, S., 2009. Pedagogy of the Oppressor. *City Journal*, https://www.city-journal.org/html/pedagogy-oppressor-13168.html

Swantz, M.L., 2008. Participatory action research as practice. *The Sage handbook of action research: Participative inquiry and practice*:31-48.

Tanko, M.G. and Atweh, B., 2012. Developing mathematical knowledge through social justice pedagogy with young adult Arab women. In *Proceedings of the 35th Annual Conference of the Mathematics Education Research Group of Australasia*. Mathematics Education Research Group of Australasia Inc.

TIMSS, 2019. Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). *TIMSS 2019 International Results in Mathematics and Science.* Retrieved from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/timss2019/international-results/

TIMSS, 2015. Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). *TIMSS 2015*

International Results in Mathematics. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/international-results/

Topping, K., 2011. Primary–secondary transition: Differences between teachers' and children's perceptions. *Improving schools*, *14*(3):268-285.

Tuck et al., 2008. In Cammarota, J., and Fine, M. *Revolutionizing education : Youth participatory action research in motion* (Critical youth studies). London: Routledge.

Udas, K., 1998. Participatory Action Research as Critical Pedagogy. *Systemic Practice and Action Research*, 11(6): 599–628.

United Nations Convention on the Rights of the Child (1989) https://www.ohchr.org/en/professionalinterest/pages/crc.aspx

Van Rens, M., Haelermans, C., Groot, W. and Vanden Brink, H.M., 2018. Facilitating a successful transition to secondary school:(how) does it work? A systematic literature review. *Adolescent Research Review*, *3*(1): 43-56.

Veugelers, W., 2017. The moral in Paulo Freire's educational work: What moral education can learn from Paulo Freire. *Journal of Moral Education, 46*(4), 412-421.

Vollman, A. R., Anderson, E. T. and McFarlane, J., 2004. Canadian Community as partner. Philadelphia, PA: Lippincott Williams and Wilkins.

Warin, J., 2011. Ethical Mindfulness and Reflexivity: Managing a Research Relationship With Children and Young People in a 14-Year Qualitative Longitudinal Research (QLR) Study. Qualitative Inquiry, 17(9):805–814.

Wassell, C., Preston, P. and Jones, H., 2007. Transition: A universal issue. *Pastoral care in Education*, *25*(1):49-53.

West, P., Sweeting, H. and Young, R., 2010. Transition Matters: Pupils' Experiences of the Primary-Secondary School Transition in the West of Scotland and Consequences for Well-Being and Attainment. Research Papers in Education, 25(1):21–50.

Whitehead, J. 2019 TED talk on 24th October 2019 www.youtube.com/watch?v=Jf1kFHLdiPY (accessed 15th April 2020)

Whitehead, J., 2000. How Do I Improve My Practice? Creating and legitimating an epistemology of practice. *Reflective Practice*, 1(1): 91–104.

Whitehead, J. and McNiff, J. 2006. *Action research living theory.* SAGE publications, London.

Wright, P., 2021. Transforming mathematics classroom practice through participatory action research. *Journal of Mathematics Teacher Education*, *24*(2):155-177.

Wright, P., 2017. Critical relationships between teachers and learners of school mathematics. *Pedagogy, Culture & Society*, *25*(4):515-530.

Zeedyk, M. S., Gallacher, J., Henderson, M., Hope, G., Husband, B. and Lindsay, K. 2003. Negotiating the Transition from Primary to Secondary School: Perceptions of Pupils, Parents and Teachers. School Psychology International, 24(1):67–79.