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The Good, The Bad and The Ugly of Teaching Maths in Further Education.

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Acknowledgements:

This thesis exists because I refused to accept that the complexity of Further Education mathematics teaching could be ignored or reduced to a single metric. But it exists equally because I persisted through circumstances that made that refusal difficult.

First and foremost, I thank my son Alfie, who made me smile during the darkest of days, and my wider family for their ongoing support. The years of this research unfolded amidst genuine institutional and personal chaos: an international pandemic, a significant change of professional role, successive cycles of external inspection scrutiny, revalidation of teacher training provision, and most significantly a family breakdown. These circumstances positioned me within the very contradictions I investigated. Working simultaneously as a practitioner and researcher exploring how teachers construct meaning, I inhabited the institutional discourse my participants described. The chaos became insight.

This thesis was made possible by ten FE mathematics teachers in Northeast England who generously shared their professional thinking with honesty and depth. Their willingness to articulate what matters to them professionally forms the foundation of every claim I make. I remain genuinely grateful for their trust.

My supervisor, Dr. Kate Duffy, provided rigorous intellectual challenge alongside sustained encouragement. She guided me toward stronger frameworks when direction wavered and reminded me of significance, when external pressures threatened compromise. Her continuous support enabled me to sustain commitment across revisions. Without her mentorship, I would have quit, many times over.

What emerges from chaos is meaningful scholarship that validates both my personal and professional journey and the voices and experiences of the teachers I worked with. This thesis proves what policy obscures: that practitioner voices matter, that lived experience shapes professional judgment, and that such meaning-making deserves serious scholarly attention. It stands as validation itself, proof that meaningful scholarship can emerge through institutional and personal complexity. This accomplishment is mine.

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Abstract:

Every year, 200,000 learners retake GCSE mathematics in Further Education. National policy calls this a failure, with only 20% achieving Grade 4. Yet the mathematics teachers in this study observe something policy cannot measure, that learners whose fear transforms into confidence, whose shame becomes engagement, whose sense of themselves as mathematical beings fundamentally shifts. These teachers recognise this as success. Policy does not.

This contradiction is not incidental. It defines daily professional experience. Teachers must cover 50 topics in 30 weeks with learners carrying years of mathematical trauma and repeated failure. The pedagogical work they identify as foundational for example, rebuilding shattered confidence, addressing deep anxiety, establishing psychological safety, takes time, cannot be rushed, and leaves no trace in achievement data. Teachers face an untenable situation where they must simultaneously meet external accountability demands while maintaining devotion to their professional judgment about what genuinely matters.

- How do teachers navigate this?
- How do they make sense of being told they're failing when they know they're succeeding?
- How do they judge their own professional effectiveness when external metrics render their most important work invisible?

This study investigated these questions through a social constructivist lens. Rather than examining whether teachers comply with or resist external standards, it asked how teachers collectively construct professional meaning when competing frameworks collide. Drawing on communities of practice theory and institutional discourse analysis, semi-structured interviews with ten FE mathematics teachers in Northeast England revealed something significant, that teachers do not simply resist or comply. Instead, they engage in ongoing institutional discourse negotiation, collectively constructing alternative definitions of success that coexist with external requirements.

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Three findings highlight this process. Professional identity develops through shared narratives such as the ‘accidental teacher’ story told by eight of ten participants and the principle of ‘rebuild confidence first’ articulated by seven participants. These narratives circulate through mentoring relationships, enabling coherent identity when formal training infrastructure is absent. Teachers also collectively negotiate professional excellence through workplace conversation, constructing quality indicators that better capture their practice. Six participants independently used ‘lightbulb moments’ to define meaningful success, explicitly contrasting this with Grade 4 achievement. Seven articulated shared critique of ‘teaching to the test’ as inappropriate professional conduct. Nine described institutional marginalisation using nearly identical metaphors, creating collective understanding of shared constraint.

The sophisticated pedagogical responses to complex challenges including addressing anxiety, demonstrating relevance, and managing extreme ability ranges emerge through peer observation, collaborative planning, and mentoring relationships rather than individual innovation or formal training.

The research reveals that collective meaning-making is not aberrant resistance but sophisticated professional navigation. Teachers maintain integrity and commitment precisely through constructing alternative quality standards. The study demonstrates how professional communities sustain themselves under impossible conditions, not by transcending constraint but by collectively making meaning within it. It offers a different understanding of professional excellence in constrained contexts where expertise emerges through the very collaborative processes that constraint necessitates.

By revealing how teachers collectively construct professional meaning under impossible conditions, the research suggests pathways for supporting rather than undermining the collaborative processes through which expertise actually develops.

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The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Chapter 1: Introduction

Chapter 1: Introduction

1.1 Introduction and Context

Every year, over 200,000 young people and adults retake GCSE mathematics in Further Education colleges across England (DfE, 2022). For many learners, this represents their third, fourth, or even ninth attempt at achieving Grade 4 (Parr, 2021). These learners embody complex intersections of educational disadvantage, economic necessity, and personal aspiration. The teachers who work with them face extraordinary challenges: rebuilding mathematical confidence destroyed by years of failure, addressing deep-seated anxiety, and preparing learners for economic opportunities that increasingly demand numerical competency. The human reality behind these statistics is captured in one practitioner's observation: 'I just can't do maths. I've never been able to do it. These words are depressingly familiar to any teacher' (Kay, 2020).

The Organisation for Economic Cooperation and Development (OECD, 2024) demonstrates that high levels of numeracy correlate strongly with increased wages, better health outcomes, and higher employment rates. Pro Bono Economics (2022) estimates that poor numeracy costs the UK economy £25 billion annually through reduced productivity, welfare dependency, and increased healthcare costs. For individuals, mathematical competency represents the gateway to economic participation in data-driven sectors from renewable energy installation requiring geometric calculations to healthcare roles demanding statistical literacy for patient care protocols. The intersection of individual economic necessity and national competitiveness makes mathematical re-engagement in Further Education not merely an educational challenge but a critical economic imperative.

Further Education serves over 2.2 million learners across 230 colleges in England, with approximately 200,000 annually enrolled in mandatory GCSE mathematics resits following 2017 policy reforms (AoC, 2023; DfE, 2022). National achievement averages 20% for resit students, a persistent pattern that raises fundamental questions about policy effectiveness and pedagogical appropriateness. In regions like North East England, where traditional industries have declined and emerging opportunities increasingly require numerical competency, from digital skills in tech sectors to data analysis in healthcare and logistics, FE mathematics teachers become crucial for addressing regional skills gaps and supporting economic regeneration. Yet despite this critical function, research into the professional experiences and pedagogical approaches of FE mathematics teachers remains remarkably limited, creating a significant gap between the sector's importance and academic understanding of its practice.

The scale and significance of mathematics education within the Further Education sector cannot be understated. The introduction of mandatory GCSE mathematics resits through the Technical and Further Education Act (2017) fundamentally transformed FE provision, requiring all learners aged 16-19 without a Grade 4 mathematics qualification to continue studying the subject alongside their main programme. This policy shift created unprecedented demand for mathematics teaching within FE, yet achievement rates hovering around 20% suggest fundamental misalignment between policy intentions and educational realities.

1.2 The Research Problem

Further Education in England serves 16-19-year-olds alongside adult learners under mandatory resit policies requiring continued mathematics study until Grade 4 achievement. Unlike community colleges in other systems, FE operates under compulsory rather than voluntary frameworks, creating what might be termed 'mandatory remediation' that fundamentally shapes the teacher-learner dynamic. FE mathematics teachers address what Hodgen et al. (2017) term 'the missing middle' in educational research, yet their unique pedagogical expertise remains largely unexplored despite being essential for reducing mathematical anxiety, improving teacher preparation, and supporting economic competitiveness in an increasingly numerically demanding economy.

The ETF (2014) study provides empirical evidence for this complexity, documenting that while collaborative working 'supports learner progression and motivates teaching staff' (p.25), 89% of colleges struggle to recruit qualified mathematics teachers, creating conditions where informal professional discourse becomes essential for practice development. This recruitment crisis reflects broader challenges within the sector: mathematics teaching positions remain unfilled 40% longer than other subjects, suggesting systemic issues around professional recognition, remuneration, and working conditions. This investigation examines how teachers collectively construct expertise through workplace discourse within these constrained conditions, exploring how professional communities develop and sustain effective practice despite structural disadvantages.

Vidal Rodeiro and Williamson's (2023) large-scale longitudinal analysis of 1.7 million students reveals the policy paradox facing FE mathematics teachers: while 'progression generally increased post-reform,' performance in post-16 mathematics was 'in contrast to teacher expectations, lower post-reform.' This empirical evidence validates practitioner concerns that curriculum intensification, rather than improving preparation, has created conditions where more students attempt advanced study, but fewer succeed, intensifying the challenges teachers

face in rebuilding mathematical confidence. The policy assumption that more rigorous GCSEs would better prepare students for post-16 study has proven empirically unfounded, yet teachers must navigate these policy consequences daily.

This investigation addresses what Gleeson and James (2007) identify as the 'missing discourse' around professional practice in constrained educational environments. While extensive research exists on teacher agency in school contexts (Priestley et al., 2015), and Bathmaker's (2013) work documents the impact of performativity on FE generally, no systematic study has examined how professional meanings emerge specifically within mandatory mathematics resit contexts. Understanding how successful practitioners maintain pedagogical innovation while meeting external requirements offers insights for supporting collaborative practice in other post-compulsory contexts facing similar accountability pressures. This study's investigation of how successful FE teachers collectively negotiate meanings of professional excellence could inform teacher preparation in similar post-compulsory contexts, particularly given the increasing recognition that mathematical anxiety and negative mathematical identity formation often originate in compulsory education.

This investigation focuses specifically on North East England because the region exemplifies these challenges in concentrated form. Post-industrial economic transformation creates urgent demand for mathematical competency in emerging sectors such as offshore wind technology, digital healthcare systems and advanced manufacturing, yet entrenched cultural attitudes inherited from traditional industries celebrate mathematical avoidance. This creates conditions where collaborative professional meaning-making becomes essential for both individual teacher survival and regional economic development. The bounded context enables deep exploration of meaning-making processes while generating insights transferable to similar post-industrial regions facing comparable economic restructuring challenges.

Research consistently documents the complexity facing FE mathematics teachers. Noyes and Dalby's (2020) comprehensive study of 32 FE colleges reveals how variations in context, curriculum, management, organisation, pedagogy, attitudes and aspirations blend to shape learner experiences and outcomes. For many learners, mathematical re-engagement represents potentially their 'third or fourth—or perhaps even eighth or ninth' attempt at achieving Grade 4 (Parr, 2021). This pattern of repeated failure creates what Nixon and Cooper (2020) term 'compound anxiety', the intersection of subject-specific mathematical apprehension with broader academic stress and fear of continued failure. This highlights how FE mathematics teaching demands expertise extending beyond subject knowledge to encompass emotional

literacy, trauma-informed pedagogy, and sophisticated approaches to rebuilding confidence among learners who have internalised mathematical failure as personal inadequacy, roles largely unrecognised in policy frameworks that measure success solely through Grade 4 achievement.

The study's broader contribution lies in challenging deficit models of adult mathematical learning and demonstrating how collective professional meaning-making can create effective educational experiences despite constraining policy frameworks. By documenting the sophisticated pedagogical content knowledge developed by FE mathematics teachers, this research advocates for professional recognition and argues for education policies that support rather than constrain contextually responsive teaching practices in comparable educational environments. The research positions FE mathematics teachers not as technicians implementing prescribed curricula but as reflective professionals developing sophisticated responses to complex pedagogical challenges through collaborative engagement.

This investigation acknowledges several limitations in existing research. While Swain et al. (2005) provided useful learner categorisation, their work predated mandatory resit policies and cannot account for how compulsory participation shapes learner engagement and teacher practice. More recently, Dalby and Noyes (2018) examined FE mathematics provision but focused on institutional structures rather than teacher experience, leaving unexplored the social processes through which professional meanings emerge. The absence of systematic research into teacher professional identity formation within mandatory resit contexts represents a significant gap requiring empirical investigation. These policy complexities create the institutional context within which teachers must address the distinctive challenges of Further Education as an educational space.

1.3 Research Significance & Urgency

This investigation addresses how FE mathematics teachers maintain pedagogical innovation within what Coffield (2008) terms 'managed professionalism'—institutional contexts where external accountability frameworks increasingly constrain professional autonomy. With accountability pressures intensifying across educational sectors, understanding collective professional practice within constrained contexts becomes increasingly relevant for similar educational environments. These insights are crucial as approaches to collective professional practice within constrained contexts become increasingly relevant for other post-compulsory settings facing similar accountability demands while serving learners whom traditional approaches have repeatedly failed.

While policy frameworks measure success through Grade 4 achievement rates, this research explores how teachers construct meaningful definitions of progress with learners who have experienced repeated failure. Understanding these alternative success measures challenges deficit models of adult learning and offers frameworks for evaluating educational impact beyond measurable outcomes, insights essential for supporting non-traditional learners across all educational contexts. The potential for collaborative approaches to achieve policy goals more effectively than compliance-focused methods warrants systematic investigation. When teachers collectively develop alternative quality indicators such as confidence improvement, engagement levels, and mathematical resilience, they create professional meanings that may better capture the complex work of mathematical re-engagement than external metrics focused solely on examination performance.

FE mathematics teaching requires distinctive approaches that simultaneously address mathematical gaps, rebuild confidence, and establish vocational relevance. This 'reparative pedagogy' differs fundamentally from both initial mathematics teaching, which assumes relatively blank slates, and university support, which assists already-successful learners seeking enhancement. Understanding how teachers collectively develop such approaches through workplace discourse has implications for teacher preparation programmes and professional development initiatives across post-compulsory education, particularly for educators working with learners who have been failed by traditional teaching approaches and carry complex histories of mathematical trauma and anxiety.

The urgency of this investigation is demonstrated by the ETF's (2014) finding that recruitment challenges affect 89% of colleges, with mathematics positions remaining unfilled 40% longer than other subjects. This recruitment challenge, familiar from the researcher's own experience leading mathematics departments, creates conditions where understanding informal professional discourse becomes critical. When formal support systems prove inadequate, with limited professional development opportunities, insufficient mentoring infrastructure, and inadequate resources for adult mathematical education, teachers must develop expertise through workplace collaboration. The ETF documented successful outcomes from such collaboration but did not examine the meaning-making processes enabling it, leaving unexplored the social mechanisms through which professional communities sustain effective practice despite structural constraints.

The North East England focus provides specific empirical grounding for understanding these challenges within distinctive regional contexts. With youth unemployment rates 23% above the

national average and a legacy of traditional industries requiring reskilling programmes, mathematical competency has become crucial for regional economic recovery (ONS, 2023). Yet recruitment data reveals that mathematics positions in FE remain unfilled 40% longer than other subject areas, with colleges reporting difficulty finding candidates who understand both mathematical content and adult learning principles (AoC, 2024). This creates a bounded context where the intersection of educational challenge, economic necessity, and professional scarcity makes visible processes that might be less apparent in more educationally advantaged regions. Teachers here must develop approaches that address both individual mathematical recovery and regional skills development, demonstrating education's role in economic regeneration strategies while navigating inherited cultural narratives that position mathematical avoidance as socially acceptable or even celebrated within working-class post-industrial communities.

1.4 FE Mathematics Teaching: Context and Research Rationale

1.4.1 Teaching Context

FE mathematics teachers work with extraordinary diversity: apprentices pursuing vocational qualifications, adult returners seeking career change or progression, and vocational students for whom mathematics represents mandatory obstacle rather than chosen subject. Research by Swain et al. (2005) identifies distinct learner profiles that teachers encounter simultaneously 'reluctant returners' viewing mathematics as obstacle to vocational goals, 'strategic completers' focused solely on Grade 4 achievement with minimal engagement beyond examination requirements, 'confidence builders' seeking to overcome previous negative experiences and rebuild mathematical self-efficacy, and 'progression planners' using FE as pathway to higher education. This typology captures fundamental tensions within mandatory resit contexts where learner motivation, previous experience, and future aspirations create complex pedagogical demands. Teachers must simultaneously address learners pursuing different goals through different motivational frameworks while maintaining collective classroom progress toward externally mandated qualification requirements. This requires what Lucas and Claxton (2010) term 'pedagogical bricolage': continuous adaptation of practice to meet competing needs while maintaining collective progress toward qualification requirements.

The 2017 GCSE reforms expanded the foundation tier from 30 to 50 topics while reducing teaching time to 30 weeks, creating unprecedented curriculum density for teachers working with previously unsuccessful learners. This policy intensification reflects broader educational trends toward curriculum breadth over depth yet proves particularly problematic in contexts where learners require extensive preparatory work rebuilding confidence and addressing

misconceptions before new content becomes accessible. These curriculum challenges intersect with complex diagnostic requirements. While standardised entry assessments provide baseline measures of procedural competency, they often fail to capture learners' mathematical anxiety, procedural versus conceptual understanding, or the impact of extended gaps in mathematical study. Teachers must simultaneously assess mathematical competence across multiple domains, identify deep-rooted misconceptions that may stem from primary education, and gauge confidence levels and emotional readiness for mathematical engagement, diagnostic work that extends far beyond simple skills testing yet receives minimal recognition within performative accountability frameworks.

Teachers must address what Wallace (2007) identifies as contributors to poor classroom motivation: fear stemming from previous failure and mathematical trauma, boredom resulting from repeated exposure to content without meaningful progress, previous negative experience creating defensive disengagement, and loss of hope that improvement remains possible after multiple unsuccessful attempts. These affective dimensions require sophisticated emotional literacy and trauma-informed pedagogical approaches rarely addressed in mathematics teacher preparation programmes designed primarily for compulsory education contexts.

This curriculum intensification occurs alongside increased assessment unpredictability. The three examination papers now feature 'completely randomised' question selection, making strategic preparation difficult and potentially increasing anxiety among learners who rely on predictable patterns for confidence building. This assessment approach, while defensible for preventing question-spotting among well-prepared candidates, creates challenges for anxious resit students whose previous examination trauma makes unpredictability additionally threatening. The general impression of the resit version of GCSE Maths is that it's a revision of prior learning at school and that learners are given a further opportunity to pass whilst at college. In real terms, this model must redress some of the shortcomings of each learner's experience of maths within compulsory education, in a very short turnaround of time, with limited prior knowledge of learning histories or specific pedagogical gaps requiring address.

The institutional landscape intensifies these challenges. College mergers and financial pressures create what Daley, Orr and Petrie (2015) describe as 'managed professionalism,' where mathematics departments operate as cost centres rather than revenue generators, facing intensified workloads with reduced professional development opportunities. Unlike vocational areas that generate higher funding returns and receive priority for equipment and software investment, mathematics provision operates under resource scarcity despite serving larger

student numbers. The region's post-industrial context creates distinctive professional challenges where teachers must address generational patterns of mathematical avoidance inherited from traditional industries like shipbuilding and coal mining, sectors where manual skills superseded numerical competency and mathematical avoidance became culturally acceptable or even celebrated, while simultaneously positioning mathematics as essential for emerging opportunities in offshore wind technology, digital healthcare systems, and advanced manufacturing requiring sophisticated numerical and data analysis capabilities.

Dispersed rural populations and limited transport links affect both teacher recruitment and learner engagement, creating what might be termed 'geographical disadvantage' compounding educational challenges. The recruitment crisis means colleges often employ teachers lacking pedagogical preparation or interest in FE mathematics teaching's specific demands, accepting applicants with mathematical content knowledge but without adult education expertise or commitment to the distinctive pedagogical challenges of mandatory resit contexts. This compounds existing challenges, as FE mathematics departments often operate in relative professional isolation compared to school mathematics departments with established professional networks and support structures. Shared professional understanding becomes particularly dependent on informal networks and regional professional development initiatives that must now also address gaps in basic pedagogical competency and subject-specific expertise among inadequately prepared staff.

Understanding how existing teachers navigate this complexity requires moving beyond external policy analysis to examine their lived professional experiences. Rather than measuring practice against imposed standards or evaluating compliance with external requirements, this research explores how FE mathematics teachers construct meaning, define success, and develop expertise within their unique educational context. The investigation privileges practitioner voice and professional wisdom over policy prescription, recognising that effective responses to complex pedagogical challenges often emerge through collaborative sense-making rather than top-down implementation of externally designed interventions.

Further Education occupies a distinctive position within post-compulsory education that differs significantly from community college or technical education systems elsewhere. Unlike voluntary adult education programmes serving motivated participants seeking skill development, FE operates under mandatory participation policies requiring continued mathematics study until Grade 4 achievement, creating 'compulsory remediation' rather than voluntary skill development. This mandatory framework fundamentally shapes the teacher-learner relationship

and pedagogical possibilities. Teachers work with learners who may resent their presence in mathematics classrooms, cannot opt out of mathematical study despite strong preferences otherwise, yet require approaches fundamentally different from initial teaching designed for younger learners without histories of repeated failure. Unlike university mathematics support, which assists motivated students seeking to improve existing competencies, or adult education programmes serving voluntary participants with intrinsic motivation for mathematical development, FE mathematics teachers navigate compulsion, previous failure, and vocational integration simultaneously. This distinctive context suggests findings may have relevance for other systems implementing mandatory basic skills requirements or working with reluctant adult learners in compulsory educational frameworks.

1.4.2 Why Teacher Voice Matters: Practitioner Motivation for This Research

This investigation emerges from a fundamental question developed through twenty years as a practitioner in Further Education, eventually becoming a Head of Mathematics: *What is it actually like to be a teacher teaching mathematics in Further Education?* During this researcher's tenure as Head of Mathematics, they faced directly the impossible complexity of this context. They consistently struggled to recruit effective teachers capable of meeting the diverse demands the department faced. While genuine progress was made during those years, achieving all of the competing expectations simultaneously felt like an impossible objective. Yet despite visible transformations in learner confidence, engagement, and mathematical resilience, institutional frameworks of success remained fixed on a single metric, the Grade 4 achievement target, rendering invisible the intricate pedagogical work teachers actually accomplished. This challenge felt even more acute when confronting the reality of learners themselves. With students attending from a variety of local schools with vastly different starting points, needs, and interests; learners arriving with different GCSE mathematics grades from their previous attempts, essentially young people with different ambitions and career pathway, with many not seeing the relevance of the qualification to their lives and a significant proportion carrying histories of multiple previous failures in mathematics.

Beyond policy analysis and achievement data, this research asks how teachers collectively construct meaning within this complex array of variables shaping daily professional experience ranging from teaching standards, qualification specifications, examination conditions, diverse and often reluctant learner populations, vocational curriculum integration, organisational policy, and funding constraints. External stakeholders offer considerable perspectives on what FE mathematics teaching should be, policymakers, curriculum specialists, funding bodies,

academics, and institutional managers. Yet few of these voices emerge from sustained frontline experience of navigating these competing demands simultaneously, of recruiting and supporting teachers, of meeting each learner's distinctive needs while maintaining collective progress toward external requirements, of facing the reality that excellence in all dimensions remains systematically unattainable within existing resource and policy frameworks.

This research addresses that absence by deliberately focusing the voices of those actually teaching, facing these challenges daily, collectively making sense of an extraordinarily complex professional context. Understanding how experienced FE mathematics teachers construct professional meaning within such complexity requires not external prescription but genuine engagement with practitioner wisdom, how those on the frontline collectively interpret their role, define success, and develop expertise despite systemic constraints that render such expertise invisible within institutional performance frameworks.

1.5 Research Framework

1.5.1 Researcher Positionality: Valuing Practitioner Experience

This research stems from recognising the value of practitioner experience as legitimate educational knowledge alongside rather than subordinate to academic theory and policy prescription. The researcher brings over twenty years within Further Education, including roles as Lead Practitioner, Engagement Curriculum Lead, Head of Mathematics Department, and current position as Initial Teacher Trainer, enabling recognition of sophisticated expertise that performance data systematically renders invisible. During this time, the researcher observed teachers demonstrating remarkable innovation in emotional literacy, contextual application, and flexible assessment approaches yet remaining invisible within institutional performance frameworks that reduce their work to 20% pass rates and position departments as failures despite profound transformations in learner confidence, engagement, and mathematical identity.

The transition to teacher education reinforced this conviction while revealing the gap between policy expectations and classroom realities. Trainee teachers consistently report feeling unprepared for the complex realities they encounter, not because they lack subject knowledge, many possess strong mathematical backgrounds from industry or academic study, but because performance data dominating institutional discourse provides no insight into the sophisticated relational and pedagogical expertise required for mathematical re-engagement with traumatised learners. Understanding how experienced practitioners construct alternative definitions of

success within constraining accountability frameworks therefore represents both empirical inquiry into collective meaning-making processes and professional commitment to documenting expertise that Ball's (2003) performativity culture systematically undervalues despite its crucial role in supporting learners whom traditional approaches have repeatedly failed to serve.

This professional background, however, represents just one perspective within a rich tapestry of practitioner knowledge. The researcher values equally the diverse insights, strategies, and understandings that other mathematics educators have developed through their unique professional journeys, those who entered teaching through industry backgrounds bringing vocational authenticity, career teachers with decades of accumulated wisdom about adult learning, subject specialists with deep mathematical knowledge, and practitioners working across multiple institutional contexts. This dual appreciation for personal practitioner knowledge and the collective wisdom of the professional community has fundamentally shaped the methodology of this study. Rather than privileging academic theory or external policy directives as authoritative knowledge sources, the research design deliberately centres multiple practitioner voices, creating space for the articulation and validation of the nuanced, contextualised knowledge that emerges from lived professional experience.

This methodological approach recognises that effective educational practice often emerges through collective professional wisdom rather than top-down policy implementation or academic prescription, positioning practitioners as both subjects and co-creators of knowledge within this inquiry. The investigation therefore examines how professional meanings develop through workplace discourse rather than assuming knowledge develops through formal training or flows unidirectionally from policy to practice. This stance reflects the researcher's conviction, developed through sustained professional observation, that the most sophisticated responses to complex pedagogical challenges often emerge through collaborative sense-making among experienced practitioners rather than through compliance with externally designed interventions that may inadequately account for contextual complexity.

This research therefore represents not merely academic investigation but professional commitment to amplifying practitioner voices too often marginalised in educational discourse dominated by policy imperatives and academic theorising disconnected from classroom realities. By documenting how experienced FE mathematics teachers construct professional meaning through collaborative engagement, the study aims to support both current practitioners seeking validation for their expertise within institutional frameworks that systematically undervalue their work, and trainee teachers requiring authentic preparation for the realities they

will encounter rather than idealised accounts disconnected from the messy complexities of mandatory resit contexts. The research acknowledges that effective teacher preparation must build upon rather than dismiss the accumulated wisdom of those who have successfully navigated these professional contexts, recognising practitioner knowledge as legitimate and valuable alongside academic theory.

1.5.2 Research Questions and Objectives

This investigation asks: *How do FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and community participation?*

While the CfEM synthesis documents widespread collaborative innovation across 21 colleges, from co-designed 'goal-free questions' (p.16) enabling mathematical exploration without predetermined endpoints to collectively developed 'responsive teaching systems' (p.11) adapting to learner needs in real-time, no research examines the underlying social processes through which these professional meanings emerge through workplace discourse. The documented success of collaborative approaches such as improved learner outcomes, enhanced teacher satisfaction and innovative pedagogical development, makes understanding these meaning-making processes essential for supporting professional development across the sector. This investigation examines how teachers make sense of their professional role within mandatory mathematics resit contexts through collaborative discussion and social interaction, exploring the mechanisms through which individual struggles become collective solutions and isolated innovations become shared practice. Rather than measuring practice against external standards or evaluating policy effectiveness through quantifiable metrics, the study examines how teachers collectively construct professional meaning through collaborative discussion and social interaction within the constraining frameworks of performative accountability and resource scarcity.

Research Aim: To understand how FE mathematics teachers collectively construct professional meanings within mandatory mathematics resits, examining how professional identities and practices emerge through workplace collaboration rather than individual reflection or formal training.

Research Objectives:

This research addresses three interconnected dimensions of collective professional meaning-making:

Research Objective 1 (RO1): Building Professional Identity Together - How FE mathematics teachers develop professional identity through conversations and shared experiences with colleagues, exploring how they collectively understand what it means to be a teacher working with learners who struggle with mathematics. This objective examines how teachers from diverse backgrounds ranging from industry professionals, career educators, and subject specialists, construct shared professional identities despite lacking common training foundations, investigating the workplace discourse through which collective understanding emerges about appropriate roles, responsibilities, and professional purposes within mandatory resit contexts.

Research Objective 2 (RO2): Creating Shared Standards of Excellence - How FE mathematics teachers navigate policy and organisational demands to define what good practice looks like in their context, examining how they develop common understandings of professional success through workplace discussions and collaborative problem-solving. This objective explores how teachers collectively negotiate alternative quality indicators that extend beyond Grade 4 achievement to encompass confidence building, engagement enhancement, and mathematical resilience development, measures that may better capture the complex work of mathematical re-engagement yet remain invisible within external accountability frameworks.

Research Objective 3 (RO3): Developing Teaching Expertise Through Community - How distinctive teaching approaches emerge when FE mathematics teachers share practice and learn together, exploring how pedagogical knowledge develops through collaborative experience rather than individual discovery or formal professional development. This objective investigates how innovations like contextualised teaching, trauma-informed assessment, and responsive pedagogy spread through professional networks, examining the social processes through which individual experimentation becomes collective practice and isolated successes become shared repertoires within communities of practice.

1.5.3 Research Context: North East England

The selection of North East England as the research context creates a specific social environment where teachers develop professional understanding through local cultural, economic, and institutional influences that interact with national policy frameworks in distinctive ways. The region's post-industrial economic transformation creates distinctive tensions between traditional employment patterns that valued manual skills over numerical competency and emerging skills requirements in sectors like offshore wind energy, digital healthcare systems, and advanced manufacturing that demand sophisticated mathematical and data analysis capabilities. This economic restructuring makes mathematical re-engagement especially

significant for regional development while simultaneously confronting inherited cultural narratives that position mathematical avoidance as acceptable or even celebrated within working-class communities shaped by generations of manual industrial labour.

This bounded context enables deep exploration of how local factors interact with national policies to shape teacher experience while maintaining sufficient diversity across institutional types such as large general FE colleges, smaller specialist providers, sixth form colleges and training providers, to generate transferable insights about collaborative meaning-making processes. With youth unemployment 23% above national average and traditional industries requiring reskilling programmes that inevitably include numerical competency development, mathematical competency becomes crucial for regional economic recovery. Yet the region faces recruitment challenges disproportionate to other areas, with isolated colleges struggling to attract specialist maths teachers while serving dispersed communities with limited educational resources. This combination of urgent need and constrained resources creates conditions where collaborative professional meaning-making becomes not supplementary enhancement but essential survival strategy for individual teachers and departments.

1.5.4 Theoretical Perspectives

This research draws on social constructivist theory as developed by Berger and Luckmann (1966) and applied to professional contexts by subsequent scholars including Wenger (1998) and Billett (2006). This research adopts social constructivism because it uniquely reveals how professional meanings emerge through collaborative negotiation within institutional constraints. While psychological approaches might examine individual teacher cognition and belief systems (Borg, 2015), and critical approaches might focus primarily on power relations and structural oppression (Avis, 2007), social constructivism offers distinctive insights into how professional meanings emerge through collaborative negotiation within institutional constraints, examining how teachers actively construct shared understanding through workplace interaction rather than passively receiving or resisting externally imposed meanings. This theoretical perspective aligns with Wenger's (1998) communities of practice theory and Billett's (2006) work on workplace learning, both demonstrating how professional knowledge develops through social participation rather than individual reflection or formal instruction.

Professional expertise in FE mathematics teaching emerges through what Wenger (1998) terms 'communities of practice', professional groupings characterised by shared learning through joint enterprise, mutual engagement, and shared repertoires of practice. Teachers develop professional knowledge not through individual reflection on isolated practice or through formal

professional development divorced from classroom realities, but through ongoing participation in workplace conversations, collaborative problem-solving addressing shared challenges, and collective sense-making about learner needs and institutional demands. This social construction occurs through both formal mechanisms such as departmental meetings, professional development sessions, and collaborative planning, with informal interactions including corridor conversations, shared problem-solving during breaks, and professional dialogue within regional networks.

Rather than viewing policy constraints as simply limiting individual agency or determining practice mechanistically, social constructivism explores how teachers collectively negotiate meaning within institutional contexts that simultaneously constrain and enable professional action. Following Holstein and Gubrium's (2008) analysis of institutional discourse, professional practice emerges through ongoing interaction between institutional discourse carrying policy imperatives and accountability demands, workplace culture reflecting departmental history and collaborative norms, and collaborative interpretation of professional roles and responsibilities through which teachers actively construct rather than passively receive professional meanings. This negotiation process enables teachers to maintain professional commitment and pedagogical innovation despite external frameworks that may inadequately recognise or actively undermine their work.

The North East England context provides insight into how broader social and economic contexts shape the collective construction of professional meanings in locally specific ways. Teachers shared understandings of their role emerge through interaction with regional economic narratives about post-industrial transformation and skills requirements, local educational cultures shaped by historical patterns and community expectations, and community expectations about mathematical education and economic regeneration that may reflect inherited attitudes from industrial heritage. This regional dimension reveals how professional meanings are constructed not in abstract space but within specific cultural contexts that shape both the challenges teachers face and the resources available for addressing them.

These frameworks converge in understanding professional expertise as socially constructed through ongoing participation in workplace communities and institutional discourse rather than residing in individual teacher cognition or flowing unidirectionally from policy to practice. This research therefore examines how professional meanings emerge through community engagement rather than focusing on individual beliefs or externally imposed standards,

investigating the social processes through which collective professional knowledge develops within the distinctive constraints of FE mathematics teaching.

1.5.5 Methodology & Potential Impact

This investigation's methodology builds on a fundamental conviction developed through the researcher's two decades of FE practice: spreadsheets tell you the headlines, but those headlines can be profoundly misleading about what happens in mathematics classrooms. During the researcher's time as Head of Mathematics, they observed teachers demonstrating extraordinary pedagogical expertise, rebuilding confidence destroyed by years of failure, developing sophisticated approaches to mathematical anxiety, creating meaningful connections between abstract concepts and learners' lives, yet remaining invisible within institutional performance frameworks that reduce their work to a 20% pass rate and position departments as failing despite profound transformations in learner engagement, confidence, and mathematical identity that extend far beyond examination outcomes.

The researcher's transition to teacher education has reinforced this conviction while revealing systematic gaps in teacher preparation. Trainee teachers consistently report feeling unprepared for the complex realities they encounter, not because they lack subject knowledge, many possess strong mathematical backgrounds from academic study or industry experience, but because the performance data that dominates institutional discourse provides no insight into the sophisticated relational and pedagogical expertise required for mathematical re-engagement. A funding allocation spreadsheet cannot capture the moment when a previously disengaged young person suddenly grasps quadratic equations because their teacher connected the mathematics to wind turbine efficiency calculations relevant to regional employment opportunities. Retention statistics fail to document the preparatory emotional work required before assessment success becomes achievable for the learners carrying years of mathematical trauma from repeated failure in compulsory education contexts that positioned them as mathematically incompetent.

This methodology prioritises understanding what experienced practitioners do when working with learners where traditional approaches have repeatedly failed, examining how professional meanings emerge through workplace discourse rather than measuring practice against external standards or evaluating policy effectiveness through quantifiable outcomes. Rather than imposing predetermined frameworks about effective practice, the investigation examines how professional meanings emerge through workplace discourse and community participation, privileging practitioner voice and collective wisdom over policy prescription or academic theory developed without sustained engagement in FE contexts. The research employs semi-structured

interviews as the primary method, treating interviews not as neutral data extraction events but as occasions where teachers make visible the collective discourse, shared language, and institutional narratives shaping their professional communities. The interview schedule addresses three interconnected domains reflecting social construction of professional expertise: professional identity formation through institutional dialogue, collective negotiation of professional standards extending beyond external metrics, and pedagogical knowledge emerging through social learning and collaborative problem-solving. Full methodological detail including sampling strategy, data collection procedures, analytical approach, quality measures, and ethical considerations appears in Chapter 3.

This investigation will contribute to understanding distinctive pedagogical content knowledge required in FE mathematics contexts, inform policy discussions about mandatory resit programmes through documenting how teachers collectively negotiate policy implementation challenges, and challenge deficit models of adult learning by documenting sophisticated approaches developed by successful practitioners working collaboratively rather than in isolation. The research establishes FE mathematics teaching as legitimate field of academic inquiry deserving sustained research attention, potentially catalysing further investigation into under-researched areas of post-compulsory education.

1.6 Summary & Chapter Overview

This introduction has established FE mathematics teaching as crucial but under-researched, with significant implications for educational policy, teacher preparation, and economic regeneration particularly in post-industrial regions undergoing economic transformation. With 200,000 learners annually in mandatory GCSE resits achieving only 20% pass rates, understanding how teachers collectively construct professional expertise within constrained institutional contexts addresses a critical gap in post-compulsory education research while potentially informing policy reform and professional development initiatives.

The research question—How do FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and community participation?—addresses three interconnected dimensions examining how professional meanings emerge through social processes rather than individual cognition or hierarchical knowledge transmission: building professional identity together despite diverse backgrounds and inadequate formal preparation, creating shared standards of excellence that extend beyond external accountability metrics, and developing teaching expertise through community participation rather than formal professional development. This social constructivist

investigation examines how professional meanings emerge through workplace collaboration in North East England's distinctive post-industrial context where economic transformation creates urgent demand for mathematical competency while inherited cultural attitudes celebrate mathematical avoidance.

The following chapters build systematically on this foundation. Chapter 2 examines literature on adult learning theory, mathematical anxiety research, and teacher identity formation to establish theoretical framework and identify three critical gaps in existing knowledge: how shared professional identities emerge through workplace discourse despite diverse backgrounds, how teachers collectively negotiate alternative quality standards within accountability constraints, and how distinctive pedagogical approaches emerge through collaborative problem-solving rather than individual innovation. Chapter 3 details methodology for investigating collective meaning-making through semi-structured interviews with ten North East teachers, explaining how social constructivist thematic analysis identifies shared discourse patterns indicating collective rather than individual meaning-making. Chapter 4 presents findings organised around the three research objectives, examining professional identity formation, standards negotiation, and pedagogical expertise development through analysis of teacher accounts revealing participation in collective professional discourse. Chapter 5 synthesises implications for teacher preparation recognising distinctive demands of FE contexts, professional development supporting collaborative rather than individualised approaches, and policy reform acknowledging implementation capacity alongside curriculum expectations.

Through the voices of teachers in North East England, this research reveals how professional meanings emerge through workplace dialogue rather than top-down policy implementation or individual discovery, contributing to understanding of collective meaning-making processes in post-compulsory educational contexts facing similar challenges of mandatory participation, diverse learner populations, and constraining accountability frameworks. This is not a study of what teachers should do based on external prescriptions, but of how professional expertise develops through collaborative engagement within the challenging realities of mathematical re-engagement for learners the system has repeatedly failed to serve.

The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Chapter 2: Literature Review

Chapter 2: Literature Review

Mathematics Teaching in Further Education: Professional Identity, Policy, and Practice

2.1 Introduction: The Invisible Expertise

Chapter 1 established that over 200,000 learners annually retake GCSE mathematics in Further Education, achieving pass rates around 20% despite policy reforms intended to improve outcomes (DfE, 2022; Hodgen et al., 2020). It identified a critical gap: while research documents that FE mathematics teachers develop sophisticated pedagogical responses to complex learner needs, we cannot explain *how* these professional meanings emerge through workplace discourse and collaborative practice. The Centres for Excellence in Maths (CfEM), established through Knowledge Exchange partnerships to improve mathematics teaching across multiple colleges, provide valuable documentary evidence of collaborative professional innovations across FE settings (2022). This chapter examines existing scholarship to establish what is known about FE mathematics teaching and to identify precisely what remains unexplored.

The central question driving this review is: *How do FE mathematics teachers collectively construct their professional identity and practice while navigating the intersection of policy mandates, institutional constraints, and the complex needs of learners who have experienced repeated educational failure?*

Three critical gaps structure this investigation. First, when teachers from diverse professional backgrounds such as engineers, accountants, industry professionals, enter FE with no common pedagogical training, how do they develop shared understanding of what constitutes 'good FE mathematics teaching'? Second, when external accountability measures position departments with 20% pass rates as failing despite profound learner transformations, how do professional communities construct alternative quality indicators? Third, when challenges such as mathematical anxiety affecting 65% of learners (Johnston-Wilder et al., 2016) exceed individual teacher capacity, how do teaching teams develop collective pedagogical expertise?

Existing research documents what teachers do, including responsive pedagogy (Knowles et al., 2015), trauma-informed practice (Nixon & Cooper, 2020), vocational contextualisation (Dalby & Noyes, 2018), but cannot explain *how* these professional meanings emerge through social interaction. This represents not merely a descriptive gap but a theoretical limitation: current frameworks focus on individual teacher development rather than examining professional knowledge as fundamentally social, constructed through workplace conversation within institutional constraints.

This chapter proceeds through four sections. Section 2.2 establishes the theoretical framework, drawing on Wenger's (1998) communities of practice and Holstein and Gubrium's (2008) institutional discourse analysis to examine collective meaning-making. Section 2.3 documents the challenging policy and institutional context within which FE mathematics teachers work. Section 2.4 reviews literature on professional practice, revealing sophisticated responses that existing research describes but cannot explain. Section 2.5 synthesises these limitations into three critical gaps requiring empirical investigation.

2.2 Theoretical Framework: Understanding Collective Learning

Professional expertise in FE mathematics teaching does not develop through individual cognition or formal training. It emerges through workplace conversations, corridor discussions about anxious learners, collaborative problem-solving during departmental meetings, shared frustrations that become collective solutions. Understanding this social construction of knowledge requires theoretical tools that can analyse how meanings emerge through discourse within institutional constraints.

Understanding this literature requires analytical tools that can examine collective meaning-making. Two complementary frameworks provide this lens: Wenger's (1998) communities of practice theory and Holstein and Gubrium's (2008) institutional discourse analysis. These frameworks structure how this review interrogates existing research, revealing what current scholarship can and cannot explain about collaborative professional development. Together, they explain how professional knowledge develops through collaborative participation while acknowledging the power relations that shape what can be legitimately discussed and valued.

2.2.1 Communities of Practice: Learning Through Participation

Wenger's (1998, p.73) central insight proves elegant: learning occurs through mutual engagement in joint enterprise that develops shared repertoires of practice. Applied to FE mathematics, this means professional expertise emerges through collaborative discourse rather than individual skill acquisition, a proposition the ETF (2014, p.25) supports through documenting how collaborative planning correlates with improved outcomes.

Three dimensions structure this framework. Mutual engagement describes how learning requires regular interaction where members develop relationships and establish working norms. In FE mathematics departments, this might manifest through weekly team meetings, informal corridor conversations about challenging learners, or collaborative planning sessions where teachers negotiate curriculum priorities. Joint enterprise refers to collectively negotiated understanding of

the community's purpose, not merely externally imposed mandates but shared meanings constructed through participation. When FE mathematics teachers collectively decide that rebuilding confidence matters more than complete curriculum coverage, they construct joint enterprise that may differ from policy expectations. Shared repertoire encompasses communal resources: teaching strategies for addressing mathematical anxiety, collaboratively developed materials for vocational integration, common approaches to diagnostic assessment that the team has refined through collective experience.

Consider how this framework highlights the challenge documented by Noyes and Dalby (2020): mathematics teaching teams typically include professionals from varied backgrounds with diverse skills and no common training. Without shared pedagogical language from formal preparation, how do these diverse professionals develop coherent approaches to teaching traumatised learners? Wenger's framework suggests the answer lies in mutual engagement, through regular participation in workplace conversations, diverse-background teachers develop shared repertoires and collectively negotiate what 'good FE mathematics teaching' means within their specific institutional context.

Yet Wenger's framework has limitations. Contu and Willmott (2003) critique its insufficient attention to power relations, how institutional hierarchies shape whose voices count, which meanings become legitimate, what can be safely discussed. In FE contexts dominated by performativity, the 'joint enterprise' Wenger describes operates under asymmetrical power relations where institutional accountability demands fundamentally shape professional discourse. A teacher cannot simply decide to abandon curriculum coverage in favour of confidence-building if such decisions jeopardise inspection grades and threaten departmental survival.

This limitation necessitates a complementary analytical approach.

2.2.2 Institutional Discourse: Negotiating Meaning Under Constraint

Holstein and Gubrium's (2008) institutional discourse analysis addresses Wenger's limitation by examining how professional meanings are negotiated within, not outside, structures of institutional power. Their concept of institutional discourse negotiation proves crucial: rather than viewing institutional power as simply repressive (preventing teachers from acting as they wish), they demonstrate how professional actors actively negotiate meanings within constraints, creating spaces for agency even under significant structural limitation.

This framework proves particularly valuable for understanding FE mathematics teaching because it acknowledges that professional meanings emerge through workplace conversations that are simultaneously enabled and constrained by institutional contexts. Teachers do not construct meanings in a vacuum, free from accountability pressures. Nor do they simply comply with imposed definitions, mechanically implementing policy mandates. Instead, they engage in ongoing negotiation—collectively developing understandings of effective practice that respond to both institutional demands and professional commitments to learner wellbeing.

When teachers at Nelson and Colne College collectively developed 'learner confidence improvement' as a success measure (CfEM, 2022, p.5), they negotiated institutional discourse. They acknowledged Grade 4 achievement as an institutional requirement while constructing alternative indicators that captured aspects of their work that external metrics could not. This negotiation occurred through workplace conversations where teachers collectively made sense of competing demands, institutional accountability, professional ethics, learner needs, developing shared understanding that enabled coordinated practice despite contradictory pressures.

Holstein and Gubrium's framework explains how such negotiation becomes possible. Institutional discourse provides both constraints (what can be legitimately claimed as 'success') and resources (professional language for articulating alternative measures). Teachers work with and against these discourses simultaneously, neither fully complying nor fully resisting, but actively constructing professional meanings through ongoing participation in institutional conversations.

2.2.3 Combined Framework: Professional Learning in Constrained Contexts

These theoretical perspectives combine to explain how FE mathematics teachers collectively navigate what Coffield (2008) terms 'managed professionalism', developing shared approaches to rebuilding mathematical confidence among learners who have experienced repeated failure while simultaneously meeting institutional accountability demands. The framework recognises that professional knowledge in such constrained environments cannot emerge through individual innovation alone but requires collaborative discourse.

This combined framework enables examination of how diverse-background teachers develop common professional identities through workplace interaction despite lacking shared training foundations. Wenger's concepts of mutual engagement and shared repertoire explain how professionals from engineering, accountancy, and industry careers can develop coherent

approaches to teaching traumatised learners. Holstein and Gubrium's institutional discourse negotiation reveals how teachers collectively construct quality indicators that extend beyond externally imposed metrics while remaining accountable to institutional demands. The communities of practice framework explains how distinctive pedagogical approaches such as trauma-informed assessment, contextualised teaching, radical differentiation, emerge through collaborative problem-solving rather than individual innovation. Understanding these processes requires examining the social mechanisms through which teachers collectively make sense of competing demands, negotiate institutional expectations, and develop pedagogical approaches that serve learners whom traditional methods have repeatedly failed.

The theoretical approach proves essential because FE mathematics teaching occurs within contradictory demands that exceed individual capacity. Teachers must simultaneously address compulsion (mandatory participation), previous failure (learners carrying mathematical trauma), vocational integration (demonstrating relevance to non-mathematical careers), and accountability pressures (Grade 4 achievement despite 20% success rates). No individual teacher possesses the pedagogical repertoire to navigate these intersecting constraints alone. Understanding how professional expertise develops therefore requires examining the social processes through which teachers collectively make sense of competing demands, negotiate institutional expectations, and develop pedagogical approaches that serve learners whom traditional methods have repeatedly failed.

This social constructivist lens positions professional knowledge development as fundamentally collaborative, occurring through workplace discourse within institutional contexts rather than through individual cognition or formal training. Lave & Wenger (1991) state professional meanings emerge not from policy transmission or academic theorising but through teachers' ongoing participation in communities of practice where they collectively construct understanding through mutual engagement, joint enterprise, and shared repertoires developed over time.

The following sections employ this analytical lens to examine existing literature, revealing both what is known about FE mathematics teaching and, critically, what remains unexplained about the social processes through which professional expertise emerges.

2.3 The Context: Policy Failure and Professional Impossibility

2.3.1 From O-Levels to Impossible Expectations

The 2014 GCSE mathematics reforms represent more than curriculum change. They exemplify a pattern of policy intensification that has transformed FE mathematics teaching from challenging work into professional impossibility.

The evolution reveals systematic policy failure. O-levels gave way to tiered GCSEs, creating what Bellamy (2017) identifies as significant pedagogical challenges when typical FE class sizes of 30-35 students span abilities from Entry Level to Grade 3, often without additional support. The 2014 reforms intensified difficulty: foundation tier expanded from 30 to 50 topics while teaching time compressed to 30 weeks (Hodgen et al., 2020). The tiered assessment structure now features 'completely randomised' question selection, defensible for preventing question-spotting among well-prepared candidates, additionally threatening for anxious resit students whose previous examination trauma makes unpredictability overwhelming.

Vidal Rodeiro and Williamson's (2023) regression analysis shows that post-16 mathematics performance was lower post-reform. This data suggests that curriculum intensification, ostensibly designed to improve preparation, actually decreased outcomes for most students. This finding critically challenges policy assumptions about reform effectiveness and raises concerns about whether intensification strategies achieve their stated goals. These findings parallel the ethical tensions Ball (2003) documented two decades ago in his analysis of the 'economy of student worth.' When resources constrain and achievement pressures intensify, teachers face impossible choices: focus on grade-boundary students with highest achievement probability or address those with greatest educational need? Bradbury's (2019) empirical work in FE settings confirms these tensions persist, documenting how teachers experience 'moral distress' when institutional metrics force such triage decisions.

Yet navigating these ethical dilemmas cannot be resolved through individual teacher decision-making. They require collective professional negotiation about what constitutes fair and effective practice, the workplace discourse this investigation examines. When policy creates pedagogical impossibility (covering 50 topics in 30 weeks with previously unsuccessful learners), individual competence proves insufficient. Teachers must collectively construct approaches through shared problem- solving (Wenger, 1998; ETF, 2014), which research demonstrates is particularly effective when individual capacity is exceeded by pedagogical complexity.

This pattern of policy intensification without implementation support creates structural conditions where collective professional responses may become necessary. Research suggests individual teacher expertise may be insufficient for addressing curriculum reforms that increase difficulty while decreasing achievement rates to 20% for FE resits. Evidence from the ETF (2014)

and CfEM (2022) indicates teachers develop collective strategies for rebuilding confidence among learners carrying histories of repeated failure. Ball (2016) argues policy mandates such outcomes without providing implementation resources such as adequate staffing, professional development time, or cross-curricular collaboration structures, positioning the resulting difficulties as teacher inadequacy rather than systemic underinvestment.

2.3.2 Performativity: Policy Contradiction and Professional Invisibility

Ball's (2003, p.216) concept of performativity describes 'a technology, a culture and a mode of regulation that employs judgements, comparisons and displays as means of incentive, control, attrition and change.' For FE mathematics teachers, this creates a fundamental contradiction in that policy mandates rebuilding confidence among traumatised learners while measuring success solely through Grade 4 achievement.

The confidence-building work is pedagogically essential. Nixon and Cooper (2020) document how learners carrying compound anxiety from repeated failure require weeks of psychological safety-building before mathematical learning becomes possible. Kay (2020) describes students arriving *'often absent, disengaged…and apathetic towards content and staff'* (p.8), requiring what Diamond (2020, p.12) terms 'emotional scaffolding.' This preparatory work directly enables assessment success, yet performative metrics cannot capture it.

This creates what Ball (2003, p.220) terms 'the terrors of performativity', the emotional and moral consequences of organising professional life around performance indicators. Bradbury (2019) documents how teachers in FE specifically experience 'moral distress' when institutional demands force prioritisation of grade-boundary students over those with greatest need, precisely the triage that performativity incentivises.

Ball's (2016) more recent analysis demonstrates intensification rather than resolution. The expansion of what he terms the 'policy ensemble' (multiple simultaneous accountability frameworks, inspection regimes, funding requirements) creates what he calls 'policy saturation' where 'there is no space free from the demands of policy' (p.1130). For FE mathematics teachers, this manifests as competing requirements: demonstrate curriculum coverage (inspection), achieve grade targets (funding), maintain retention (quality metrics), ensure employer satisfaction (progression).

Yet the professional work essential for effectiveness remains systematically invisible. When CfEM (2022, p.5) documents teachers at Nelson and Colne College measuring success through 'learner confidence improvement' and 'relatability of workshop content' rather than Grade 4

achievement alone, they exemplify what Coffield (2008) identifies as 'managed professionalism', institutional contexts where external accountability frameworks increasingly constrain professional autonomy, forcing teachers to negotiate alternative meanings of excellence within rather than outside institutional constraints

If external accountability frameworks cannot capture teachers' confidence-building work, how do professional communities collectively construct alternative quality indicators through workplace discourse? Understanding this negotiation process proves essential for developing accountability structures aligned with rather than contradicting effective practice.

2.3.3 The Mandatory Resit Policy: Systemic Implementation Failures

Three cascading failures characterise implementation.

First: Implementation Misalignment

The Technical and Further Education Act (2017) created what might be termed 'compulsory remediation', mandatory GCSE mathematics resits for all 16-19-year-olds without Grade 4. This policy exemplifies what Ball (2016) identifies as enactment without adequate consideration of implementation capacity. O'Leary and Wood (2017) document fundamental misalignment between inspection criteria designed for traditional academic settings and the reality of teaching mathematics to vocationally focused, often reluctant learners. This exemplifies what Biesta (2010) critiques as education's mechanistic treatment: policy expectations (comprehensive curriculum coverage within 30 weeks) fundamentally misalign with pedagogical reality (rebuilding confidence among traumatised learners).

The consequence? Time-intensive anxiety-reduction work becomes professionally invisible because performative accountability frameworks cannot capture it (Coffield, 2008). Teachers spend weeks establishing psychological safety before mathematical learning becomes possible, work essential for effectiveness yet measuring as 'slow curriculum coverage' within inspection frameworks designed for initial teaching rather than re-engagement after repeated failure. This misalignment creates what Biesta (2010) identifies as fundamental contradiction between policy expectations and pedagogical reality.

Second: Resource Displacement and Vocational Integration Barriers

Dalby and Noyes (2015) reveal persistent challenges around resource allocation that reflect not oversight but ideological prioritisation. Mathematics provision struggles for perceived relevance within vocationally focused institutional cultures (Hodgen & Marks, 2013). Under funding

pressures and performance accountability, institutional leaders perceive mathematics provision as resource intensive with limited returns.

This perception follows Ball's (2012, p.18) neoliberal education logic: when provision serves policy compliance rather than commercial goals, it receives minimal investment. Vocational areas generating funding returns receive equipment and software. Mandatory 'remedial' provision operates under scarcity. The mathematics department becomes what Beetham and Sharpe (2013) document: systematically under-resourced despite serving larger student numbers than many vocational programmes.

While Ball (2003, 2016) identifies performativity's disciplinary mechanisms, Biesta (2010) extends this critique by questioning whether education can be meaningfully 'steered' through measurement at all. Where Ball focuses on performativity's psychological and ethical consequences for teachers, Biesta interrogates its epistemological foundations, arguing that the measurable and the educationally desirable occupy fundamentally different domains. Coffield (2008) bridges these perspectives by documenting how FE specifically experiences what he terms 'managed professionalism'—performativity's mechanisms operating with intensity in a sector where Ball's general analysis manifests through wave after wave of policy initiatives. Together, these scholars reveal performativity not as isolated phenomenon but as systematic restructuring of professional practice. These mechanisms, applied systematically in FE settings, create the proletarianised conditions. Randle and Brady (1997, p.127) describe professional autonomy constrained by resource deficit while accountability demands intensify. Teachers compensate through unpaid labour: creating resources, adapting materials, developing contextualised examples connecting abstract mathematics to vocational applications that curriculum materials ignore.

Lucas et al. (2012) identify multiple obstacles to meaningful integration, for example timetabling constraints preventing cross-curricular collaboration, hierarchical positioning of academic subjects below vocational programmes, and funding mechanisms separating mathematical from vocational learning. In response, practitioners develop informal integration strategies through workshop observations, vocational staff consultation, and independent resource creation (Dalby & Noyes, 2016). This informal compensation demonstrates professional commitment while simultaneously highlighting systemic failure to provide necessary implementation infrastructure. Teachers work around rather than within institutional structures, compensating for absent support through individual or small-group labour that policy assumes but refuses to resource.

Third: Recruitment Crisis - The Capability Gap

Belgutay and Martin's (2016) Association of Colleges survey reveals that almost nine in ten colleges struggle to recruit mathematics teachers. This recruitment crisis represents fundamental 'capability gap' between policy expectations and institutional capacity. When 90% of colleges cannot recruit adequate mathematics teachers yet must deliver mandatory provision, policy has created structurally impossible conditions.

The post-Brexit landscape compounds these challenges. Henderson (2023) documents how European Social Fund losses particularly affect regions like the North East, which previously received significant ESF support for skills development. This funding reduction intensifies an already critical recruitment crisis, creating conditions where smaller colleges may lack the critical mass of mathematics teachers necessary for sustained professional communities.

2.3.4 Institutional Marginalisation

Institutional Marginalisation Makes Collaboration Essential

The marginalisation of mathematics within FE institutions creates professional isolation that drives teachers toward informal workplace discourse out of necessity rather than preference. Mathematics classes often receive less favourable scheduling, inadequate spaces, and limited technological resources compared to vocational programmes (Beetham & Sharpe, 2013). This reflects institutional priorities framing mathematics as mandatory rather than valuable, something to be endured for compliance rather than invested in for educational impact.

This spatial and resource marginalisation fundamentally shapes how professional expertise develops. When mathematics provision receives structural disadvantage, teachers cannot rely on institutional infrastructure to support practice. Instead, they must collectively construct alternative support networks through workplace discourse, sharing resources, adapting spaces collaboratively, developing pedagogical strategies that compensate for structural constraint.

2.3.5 Adult Learners: When Anxiety Becomes the Curriculum

Beyond Individual Teacher Capacity

Johnston-Wilder et al.'s (2016) finding should fundamentally reshape understanding of FE mathematics teaching: mathematical anxiety affects 65% of apprentices at moderate to high levels. Not a minority requiring individualised support. Two-thirds of every classroom.

At this scale, addressing mathematical anxiety may exceed individual teacher capacity. No single practitioner possesses the pedagogical repertoire to simultaneously rebuild confidence among 20+ anxious learners with diverse trauma histories while covering 50 topics in 30 weeks. Research

suggests this scale of challenge potentially necessitates collaborative expertise development, where professional communities construct shared trauma-informed approaches through workplace problem-solving. Nixon and Cooper (2020) document how students arrive carrying 'complex histories of mathematical anxiety, failure, and disengagement,' identifying 'compound anxiety', the intersection of general academic stress with subject-specific mathematical apprehension. This particularly affects GCSE resit students, who combine past mathematical trauma with recent educational disruption. Yet their work with the 'Essential 8' programme demonstrates that when teachers collectively develop 'growth zone' approaches, individuals can move from anxiety to engagement.

Kay (2020) captures the compound challenges: 'Students are often absent, disengaged when attending and apathetic towards content and staff. This is all before considering the anxiety and mental health issues caused by repeatedly having to sit high-stakes exams.' Johnston-Wilder and Lee's (2022) concept of mathematical resilience, the capacity to sustain engagement with mathematical challenges despite obstacles, has become increasingly central to understanding student wellbeing in mathematics education.

Adult Learning Theory Meets Compressed Timescales

Knowles et al. (2015) identify how FE practitioners develop 'responsive pedagogy', adaptive approaches responding to emotional, cognitive, and practical needs of learners with complex mathematical histories. This flexibility represents advanced professional expertise developed experientially rather than through formal training.

Yet compressed timescales for curriculum coverage with previously unsuccessful learners necessitates fundamental pedagogical reconsideration. Swan (2006) advocates prioritising conceptual depth over superficial breadth, leading practitioners to strategic prioritisation: identifying vocationally essential concepts, building confidence through achievable goals, accepting partial specification coverage.

This strategic prioritisation cannot emerge from individual decision-making but requires collective professional judgment about what constitutes effective practice in contexts where traditional measures prove inappropriate. The consistency of such prioritisation across multiple institutions, documented by CfEM (2022), ETF (2014), and Noyes and Dalby (2020), suggests knowledge constructed through professional networks rather than discovered independently.

Mathematical Identity in Post-Industrial Contexts

Noyes (2007, p.67) notes that mathematics is 'often seen as boring, irrelevant, and difficult,' while Dalby (2013, p.62) finds that vocational students 'do not see its relevance to their lives or future careers.' Solomon's (2012, p.175) research reveals how mathematics is perceived as 'geeky' or 'uncool'...at odds with social identities,' necessitating teachers to develop strategies that challenge these deeply embedded cultural assumptions.

In post-industrial regions like the North East, this cultural narrative reflects industrial heritage where mathematical competence was historically less valued than manual skills. The transition to post-industrial economy creates challenges as teachers must help learners reconcile family narratives ('Granddad never needed maths') with economic realities where emerging sectors require sophisticated numerical competency (Thompson & Hatfield, 2019). This requires teachers to collectively develop counter-narratives connecting mathematical thinking to emerging vocational areas, green energy, digital sectors, advanced manufacturing, that were absent from traditional industrial contexts.

Student Perspectives Challenge Policy Assumptions

Norris's (2023) research with 187 FE students reveals sophisticated learner perspectives that challenge policy assumptions about linear progression. Students construct three distinct relationships between GCSE and Functional Skills: a 'race' metaphor emphasising temporal pressure to reach the 'finish line' of Grade 4; a 'fork in the road' representing mutually exclusive pathways between use value (Functional Skills) and exchange value (GCSE); and a 'non-journey' where qualifications become indistinguishable obstacles.

These student constructions directly impact teacher professional practice. When students view mathematical progression as a 'race,' teachers must collectively develop approaches maintaining engagement despite repeated failure. The 'fork in the road' metaphor reveals how qualification positioning creates impossible choices, students 'can either have the benefit of the greater use value of FS or the greater exchange value of GCSE but not both' (Norris, 2023, p.56). Teachers must navigate these student frustrations while maintaining curriculum coherence and meeting accountability demands, work requiring collective negotiation rather than individual problem-solving.

Teacher Wellbeing and Retention

Johnston-Wilder et al. (2016) found that many UK FE teachers face substantial pressures in addressing mathematical anxiety, often lacking adequate professional development opportunities, with 42% considering leaving the profession. The affective dimension of FE

mathematics requires pedagogical approaches addressing emotional before cognitive barriers. Wallace's (2007) identification of fear, boredom, negative experience, and hopelessness as engagement barriers aligns with literature on mathematical anxiety in adult learners, yet formal teacher preparation rarely addresses these dimensions of practice.

The salary differentials documented by Smith et al. (2017) compound these challenges. Mathematics graduates entering FE teaching earn starting salaries averaging £24,000-£26,000, representing differentials of 20-30% compared to industry roles (averaging £32,000-£35,000 in financial services or data analytics) or even secondary teaching (averaging £28,000-£30,000 with initial teacher training bursaries). Their survey of 200 mathematics graduates reveals that 67% cited financial considerations as primary factors in rejecting FE teaching careers despite interest in adult education.

Teachers who persist despite these financial disincentives find alternative forms of professional satisfaction, transformative moments with previously disengaged learners (Dalby & Noyes, 2016), suggesting professional identity develops through intrinsic motivation and collective professional support rather than external reward structures.

Summary: Context Necessitating Collective Response

The context documented throughout Section 2.3 creates what might be termed 'impossible professional conditions.' Policy intensification mandates covering 50 topics in 30 weeks with previously unsuccessful learners (2.3.1-2.3.2). Performative accountability measures only Grade 4 achievement while rendering invisible the time-intensive work of addressing anxiety, rebuilding confidence, demonstrating vocational relevance (2.3.3). Institutional marginalisation creates resource scarcity and professional isolation (2.3.4). Adult learner characteristics, mathematical anxiety affecting 65% of students, compound trauma from repeated failure, inherited cultural narratives celebrating mathematical avoidance, create pedagogical challenges exceeding individual capacity (2.3.5).

When formal structures systematically fail, teachers must collectively construct alternative support systems through workplace discourse. This is not supplementary enhancement but fundamental necessity. Understanding how professional meanings emerge through collaborative engagement becomes essential for explaining how FE mathematics teachers sustain effective practice despite constraining conditions that policy creates but refuses to resource.

The following section examines literature on professional practice itself, revealing sophisticated responses to these challenges, responses that existing research can describe but not explain.

2.4 Professional Practice: Sophisticated Responses, Unexplained Processes

Having established impossible conditions, we turn to how teachers respond. The literature reveals sophisticated professional practices, identity construction from diverse backgrounds, negotiation of alternative quality standards, development of distinctive pedagogical approaches. Yet a fundamental limitation runs through this research: it documents *what* teachers do without explaining *how* these meanings emerge through social interaction.

2.4.1 Becoming 'FE Maths Teachers': Identity Without Common Foundation

The Non-Traditional Journey

The journey into FE mathematics teaching fundamentally differs from traditional educational career paths. Unlike secondary education counterparts who follow linear progressions from university through teacher training into classrooms, FE maths teachers frequently arrive through non-traditional routes, bringing diverse professional experiences but often lacking formal pedagogical preparation (Thompson & Hatfield, 2019).

Career-changers bring valuable industry experience: engineers may apply systematic problem-solving approaches, accountants offer real-world financial contexts, those from service industries understand interpersonal dimensions of adult education (Orr & Simmons, 2010). Yet this diversity creates fundamental challenges. Without shared pedagogical language or common training experiences, how do these diverse professionals develop coherent, coordinated approaches to teaching traumatised learners?

One teacher interviewed by Noyes and Dalby (2020) captured this transition: '*I came from industry thinking I'd just explain the maths, but quickly realised these students needed me to rebuild their belief they could do maths at all before any teaching could happen*' (p.14).

This shift represents profound professional learning that occurs not through formal training but through daily encounters with learners whom traditional approaches have repeatedly failed. Engineering or accountancy degrees provide mathematical expertise but not trauma-informed pedagogy for adult learners carrying generational mathematical avoidance.

Financial Sustainability and the Retention Crisis

Smith et al.'s (2017, p.45) statistical evidence points to systemic challenges affecting professional sustainability. Mathematics graduates entering FE teaching face salary differentials of 20-30% compared to industry roles or even secondary teaching. While initiatives like F.E. STEM bursaries address financial barriers to entry, they cannot address ongoing salary differentials of

£6,000-£11,000 annually between FE mathematics teaching salaries and alternative career paths.

This creates what might be termed 'financially unsustainable professionalism.' Financial pressures intensify post-qualification precisely when teachers develop sophisticated expertise through experience. The recruitment crisis documented by Belgutay and Martin (2016), 90% of colleges struggling to recruit mathematics teachers, reflects not merely insufficient initial recruitment but inability to retain experienced practitioners who can command significantly higher salaries elsewhere. Teachers who persist find alternative professional satisfaction through transformative moments with previously disengaged learners (Dalby & Noyes, 2016). This suggests professional identity develops through intrinsic motivation and collective professional support rather than external reward structures, the workplace discourse that this investigation examines.

Professional Development Inadequacies Drive Informal Learning

Drury (2021) identifies limited access to subject-specific training as a key concern, while Sherwood (2019) notes insufficient mentoring support, particularly for early-career teachers. While initiatives like Maths Hubs and NCETM provide resources, McCrea (2020) finds only 34% of FE teachers have adequate time for engagement. Centres for Excellence in Maths (CfEM) aim to provide professional communities, yet geographical and institutional factors limit access. Smaller colleges in regions like the North East might lack critical mass for subject-specific support networks, intensifying reliance on informal workplace discourse for professional learning.

The Identity Formation Challenge

Noyes and Dalby (2020) found that 'mathematics teaching teams typically include teachers from varied backgrounds with diverse skills and experience who have varied training needs depending on their entry route' (p.6). This diversity creates a fundamental professional challenge that existing research on individual identity formation (Beijaard et al., 2004) cannot explain. When engineers, accountants, and service industry professionals, with no common pedagogical foundations, develop shared understanding of 'good FE mathematics teaching,' something more than individual identity formation occurs. Existing research documents the *condition* (diverse backgrounds) but not the *process* (how shared professional meanings emerge through workplace discourse). This gap drives Research Objective 1: How do diverse-background teachers construct shared professional identities through institutional discourse and community participation? The

ETF (2014) demonstrates that collaborative approaches correlate with improved outcomes, yet existing research examines structural conditions (regularised meetings, collaborative planning) without investigating the meaning-making mechanisms enabling such collaboration.

2.4.2 Redefining Success: Collective Negotiation of Professional Standards

The Performativity Trap

Ball (2003, p.222) argues that each time teachers focus on grade-boundary students rather than those with greatest need, performativity achieves its disciplinary function, reshaping professional practice through what he terms the 'economy of student worth.' Two decades later, these ethical tensions have intensified rather than resolved. Bradbury's (2019) empirical work in FE settings confirms how teachers experience 'moral distress' when institutional metrics force such triage decisions.

The Education Inspection Framework (2019) potentially intensifies these structural pressures through quality measures misaligned with FE contexts. O'Leary and Wood (2017) document misalignment between inspection criteria designed for traditional academic settings and reality of teaching mathematics to vocationally focused, often reluctant learners. Multiple accountability frameworks create competing demands while failing to capture practice complexity.

When Measurement Contradicts Educational Purpose

Biesta (2010) argues that education fundamentally cannot be 'steered and controlled' through clear targets because mechanistic views focus on what is measurable rather than educationally desirable. His argument proves particularly salient for FE mathematics: while Grade 4 achievement is measurable, rebuilding mathematical confidence among adults who have experienced repeated failure resists quantification.

The necessity for teacher-constructed success measures becomes evident when examining disconnect between policy intentions and student outcomes. Vidal Rodeiro and Williamson's (2023) finding that only students achieving 'very top GCSE grades' showed improved post-16 performance reveals how traditional success metrics fail most FE learners. Simultaneously, Norris's (2023) research documents how students value 'familiarity' and 'opportunity to achieve' over abstract qualification levels, dimensions of success that formal accountability frameworks cannot capture.

Alternative Measures Through Collaborative Practice

Diamond's (2020) account highlights transformation that external metrics miss: 'At the end of the day, we noticed an immediate impact. Leaving the university, learners had their heads held high, a stark contrast to the arrival. It was as if night had turned into day in 90 minutes.' This demonstrates how teachers construct meanings of success extending beyond Grade 4 achievement to include confidence, engagement, aspiration, measures external accountability frameworks struggle to capture but professional communities recognise as essential.

The CfEM evidence demonstrates how these alternative measures emerge through specific practices. At Nelson and Colne College, teachers developed small group workshops, measuring success through 'learner confidence improvement' and 'relatability of workshop content' rather than Grade 4 achievement (CfEM, 2022, p.5). At Leyton Sixth Form College, teachers developed '30-minute discussion-based reviews' where 'learners were put into pairs comprising one learner whose knowledge is more secure than the other and asked to discuss and write down feedback on two anonymised answers to the same maths problem' (CfEM, 2022, p.10).

The Unexplained Process

Yet a crucial question remains unanswered: *How* did teachers at Nelson and Colne College collectively decide these indicators mattered more than Grade 4 achievement? Through what conversational processes did they negotiate this redefinition? How do such alternative definitions spread across professional communities, appearing consistently at multiple CfEM sites?

The literature provides snapshots of alternative measures without explaining the institutional discourse through which they become collectively legitimate. Holstein and Gubrium's (2008) concept of institutional discourse negotiation suggests professional meanings emerge through ongoing workplace conversation rather than individual reflection. Yet existing research provides no framework for understanding this process in FE mathematics contexts where teachers must simultaneously acknowledge institutional accountability demands (Ball, 2016) while constructing alternative professional standards (Noyes & Dalby, 2020).

The ETF (2014) documented successful outcomes from practices like 'Teaching and Learning Takeaways' where 'tutors receive various new teaching resources' and 'maths hubs that work with multiple schools to share best practice' (p.25). Noyes and Dalby's (2020) cross-case analysis revealed that while 'achievement rates persistently around 20%' suggest policy failure, teachers construct alternative indicators focusing on 'students' backgrounds, prior experiences, attitudes, and aspirations' (p.5).

These consistent patterns across multiple sites suggest systematic rather than idiosyncratic redefinition. Yet existing research cannot explain this pattern without examining the workplace discourse through which professional communities construct shared meanings, the gap Research Objective 2 addresses.

2.4.3 Pedagogical Expertise: Collaborative Solutions to Impossible Demands

Contextualised Teaching in Post-Industrial Regions

FE mathematics teachers develop approaches simultaneously rebuilding confidence, addressing anxiety, and demonstrating vocational relevance through what Knowles et al. (2015) conceptualise as 'responsive pedagogy.' Given compressed timescales for curriculum coverage with previously unsuccessful learners, teachers apply strategic prioritisation, focusing on vocationally essential concepts and confidence-building over complete curriculum coverage (Swan, 2006).

In post-industrial regions, teachers develop contextualisation strategies connecting mathematical thinking to emerging industries. Research critiques surface level approaches that merely add vocational contexts to abstract problems as ineffective (Dalby & Noyes, 2018). Instead, effective practice involves deep integration where mathematical thinking emerges authentically from vocational practice, requiring understanding both mathematical structures and vocational applications (Hodgen et al., 2014).

This deep vocational integration cannot emerge through individual trial-and-error but requires the collaborative problem-solving Research Objective 3 examines: teachers collectively determining which mathematical concepts prove essential for specific trades, sharing contextualisation strategies, refining approaches through mutual engagement.

Innovations From Collaborative Problem-Solving

Nixon and Cooper's (2020) 'Essential 8 programme' exemplifies collaborative pedagogical development. Rather than attempting comprehensive curriculum coverage, their approach focuses on eight core topics repeatedly over extended periods. Yet their account references collaborative decision-making without examining the discourse through which it occurred: 'teachers asked themselves what are the essential core, big concepts students really need to tackle to rebuild their confidence in maths' (p.3).

How did teachers collectively determine which eight topics constituted 'essential'? Through what conversational mechanisms did they negotiate prioritising depth over breadth? The innovation

clearly emerged through collaborative problem-solving, yet the social process enabling this collective achievement remains unexplored.

Kay's (2020) innovation showcases similar patterns through 'maths topic assessment grids' where learners 'became more focused on their individual learning journey rather than working competitively.' Kay describes 'much trial and error' developing these grids, suggesting iterative refinement through practice yet providing no framework for understanding how collective learning occurred.

The CfEM synthesis documents innovations from 'goal-free questions' that improve willingness and outcomes (p.16) to 'ratio tables' enabling previously unsuccessful learners to solve mathematical problems (p.5). The consistency of innovations across multiple sites suggests pedagogical knowledge spreads through professional networks rather than emerging independently. Yet literature cannot explain the social processes enabling this diffusion.

Maths Mastery Adaptations Require Collective Judgment

Drury (2018) explains how Maths Mastery emphasises depth over breadth, with learners who grasp concepts quickly being challenged through rich, sophisticated problems rather than accelerated through new content. Those needing additional support receive focused intervention through concrete manipulatives, visual representations, and repeated practice with varying contexts building from familiar vocational scenarios toward abstract mathematical structures.

Foster (2013) demonstrates how teachers might spend three sessions on place value if foundational understanding is lacking. This patient approach contradicts pressure to cover all specification content but reflects professional judgment about prerequisite knowledge for mathematical progression.

Yet such strategic decisions require collective professional judgment rather than individual expertise. When Swan (2006) advocates prioritising conceptual depth, teachers must collectively negotiate implementation within local contexts. The literature documents that such negotiation occurs (CfEM, 2022; ETF, 2014; Noyes & Dalby, 2020) but provides no theoretical framework for understanding the social processes involved—the gap this investigation addresses.

Differentiation Under Constraint

Differentiation within FE mathematics requires what might be termed 'radical differentiation', accommodating extreme diversity where learner ranges span Entry Level to Grade 3 within single classrooms, with varied vocational destinations, learning preferences, and mathematical

anxieties (Casey et al., 2006). FE practitioners develop multiple simultaneous learning experiences within single sessions through peer tutoring, rotational grouping, or independent pathways with scaffolded resources (Tomlinson, 2014).

Yet resource constraints fundamentally shape pedagogical possibilities. Beetham and Sharpe (2013) document how vocational areas receive priority for equipment and software because they generate higher funding returns, while mandatory 'low value' provision like GCSE resits operates under resource scarcity. The absence of appropriate resources for adult GCSE learners necessitates significant unpaid teacher labour for material adaptation and creation.

This labour distribution reflects performative accountability's ideological displacement: policy mandates outcomes without providing implementation resources, then positions teachers' compensatory labour as professional expectation rather than systemic failure. Teachers compensate collectively, sharing adapted resources, collaboratively developing contextualised materials, pooling technological access. This collective response to resource constraint exemplifies the workplace discourse this investigation examines.

Technology Integration: Contradictory Evidence Requires Collective Sense-Making

The integration of technology presents complex challenges requiring collective professional judgment. Adaptive learning platforms like Century and HegartyMaths offer promising potential, with Luckin et al. (2012) documenting 45% increases in voluntary practice when students access personalised learning pathways. However, these benefits are tempered by concerns about surface learning when students become overly reliant on hint systems (Hoyles et al., 2010).

Virtual manipulatives prove particularly valuable for adult learners in vocational contexts. Pratt's (2012) research demonstrates how GeoGebra enables students to explore geometric concepts directly relevant to their trades, construction students modelling roof angles, engineering students analysing gear ratios, art students exploring tessellations. Yet Hoyles et al. (2010) warn that without structured pedagogical guidance, learners may use such technology merely to obtain answers without developing genuine mathematical understanding.

The contradictory guidance within literature, Luckin et al. (2012) documenting benefits, Hoyles et al. (2010) warning of risks, creates what might be termed 'impossible professional decisions,' a tension that existing research acknowledges but cannot resolve without examining how teachers collectively navigate such contradictions. Optimal technology integration cannot be determined through isolated trial-and-error but requires shared workplace discourse where colleagues pool experiences and construct collective wisdom. The literature documents that such collective

sense-making occurs yet provides no framework for understanding the social processes involved.

Assessment as Relational Practice

While terminal examinations demand procedural fluency demonstration, effective practitioners develop complex formative assessment strategies capturing conceptual understanding and confidence development. Black and Wiliam's (1998) seminal work on formative assessment, combined with Boaler's (2015) growth mindset framework encouraging viewing mistakes as learning opportunities, creates assessment cultures supporting rather than hindering mathematical development.

Yet Black and Wiliam's work was developed primarily in school contexts with fundamentally different temporal structures (academic years vs. 30-week programmes), student populations (compulsory vs. reluctant adult learners), and accountability pressures (developmental vs. performative). As Wiliam (2011, p.13) himself acknowledges, 'FE mathematics teachers face unique challenges in implementing assessment strategies with resit students who have experienced previous failure.'

Teachers develop shared approaches that rebuild confidence rather than reinforcing failure patterns. Kay (2020) describes how collaborative assessment design prioritised learner wellbeing: 'With the results of the maths grids being known only to individuals, we found they became more focused on their individual learning journey rather than working competitively.' Nixon and Cooper (2020) document innovative assessment approaches where 'students were asked to work in groups on a complex problem-solving activity while simultaneously monitoring their 'zones' through the use of red/amber/green cards' (p.5).

The relationship between Black and Wiliam's (1998) formative assessment framework and FE mathematics contexts reveals important tensions within the literature. While their work demonstrates formative assessment's potential, Wiliam himself (2011, p.13) acknowledges that 'FE mathematics teachers face unique challenges with resit students who have experienced previous failure.' This creates what might be termed 'contextual limits to transferability': established frameworks developed in school settings may require fundamental rather than superficial adaptation for FE contexts. Kay's (2020) and Nixon and Cooper's (2020) documented innovations suggest teachers develop such adaptations collaboratively, yet existing research including Black and Wiliam's original work, cannot explain the social processes through which pedagogical frameworks transfer across educational contexts.

These practices demonstrate assessment extending beyond measurement to encompass emotional support and metacognitive awareness. Yet their development required collective professional judgment adapting established frameworks to FE contexts, social processes the literature describes but cannot explain.

Mathematical Content Knowledge and Pedagogical Transformation

FE mathematics teachers develop distinctive pedagogical approaches when navigating compressed curriculum timescales with previously unsuccessful learners, necessitating strategic prioritisation that includes identifying vocationally essential concepts, building confidence through achievable goals, accepting partial specification coverage (Dalby & Noyes, 2016). Yet such strategic prioritisation cannot emerge from individual subject expertise alone; Ball et al. (2008) document how pedagogical content knowledge, which is teachers' understanding of how to represent subject matter to diverse learners, enables anticipation and addressing of conceptual challenges. More importantly, strategic prioritisation requires collective professional judgment about what constitutes effective practice in contexts where traditional measures prove inappropriate.

Summary: Sophisticated Practice, Unexplained Emergence

The literature reviewed throughout Section 2.4 reveals sophisticated professional practices developing within challenging contexts. Teachers construct professional identities from diverse entry routes (2.4.1), negotiate quality standards between external accountability and professional judgment (2.4.2), and develop pedagogical expertise addressing mathematical anxiety, vocational relevance, and resource constraints (2.4.3).

These practices demonstrate professional resilience and innovation. Yet a fundamental limitation runs through this research: it focuses primarily on describing *what* teachers do rather than explaining *how* these professional meanings emerge through social interaction. The sophistication of documented practices, such as trauma-informed assessment, contextualised teaching, radical differentiation and strategic curriculum prioritisation, suggests knowledge constructed through shared problem-solving rather than discovered individually.

When Nixon and Cooper (2020) developed the Essential 8 programme, when Kay (2020) created assessment grids prioritising individual learning journeys, when teachers at Nelson and Colne College constructed 'learner confidence improvement' as a success measure (CfEM, 2022), these innovations emerged through collaborative discourse. Yet the literature provides no

framework for understanding the social processes through which professional communities move from individual struggle to collective solution.

The following section synthesises these limitations into three critical gaps requiring empirical investigation.

2.5 Critical Gaps: What Research Cannot Yet Explain

The literature reveals a fundamental paradox: we can describe sophisticated professional practice but cannot explain how it develops.

2.5.1 Before the Gaps: Acknowledging Research Limitations

The very frameworks underpinning this review present methodological limitations shaping what can and cannot be claimed about FE mathematics teaching.

Uncritical Transfer from School Contexts

This review draws extensively on established frameworks from school-based research, Black and Wiliam's (1998) formative assessment, Dweck's (2006) growth mindset, Drury's (2018) Maths Mastery adaptations. Yet their applicability to FE contexts requires critical examination. These frameworks were developed for school settings with fundamentally different temporal structures (academic years vs. 30-week programmes), student characteristics (compulsory vs. reluctant adult learners), and accountability pressures (developmental vs. performative).

As Wiliam (2011, p.13) himself acknowledges, 'FE mathematics teachers face unique challenges in implementing assessment strategies with resit students who have experienced previous failure.' The uncritical transfer of school-based pedagogical models to compressed FE timescales, with learners carrying mathematical trauma, may be inappropriate. Understanding which aspects of established frameworks prove effective in FE contexts and which require fundamental reconceptualisation represents a gap this study acknowledges but cannot fully address.

Neoliberal Ideology Remains Under-Theorised

Existing research extensively documents how neoliberal ideology operates through performativity in education (Ball, 2003, 2016; Coffield, 2008; Randle & Brady, 1997). However, theoretically unexplored is how professional communities collectively negotiate, adapt, or resist such frameworks through workplace discourse specifically in FE mathematics. While Ball theorises performativity's constraints on individual teachers, no research examines how collaborative professional discourse functions under neoliberal conditions—whether workplace

conversations enable resistance, merely reproduce institutional imperatives, or create spaces for alternative meanings of excellence. This social dimension of professional response to neoliberal ideology remains theoretically unexamined in FE contexts.

Evidence Base Limitations

Much practitioner innovation documented through CfEM (2022), ETF (2014), and individual accounts (Nixon & Cooper, 2020; Kay, 2020; Diamond, 2020) lacks longitudinal rigour necessary to establish causal relationships between collaborative practices and sustained outcomes. While these accounts provide valuable insight into professional meaning-making processes, their largely descriptive rather than analytical nature means they cannot explain *how* collaborative discourse produces the pedagogical innovations documented.

The predominance of snapshot case studies over sustained ethnographic research leaves unexplored the temporal dynamics through which professional meanings evolve, a limitation this investigation's cross-sectional design necessarily inherits.

With these limitations acknowledged, three critical gaps emerge from the literature.

2.5.2 Gap 1: The Mystery of Shared Identity

What We Know

The literature tells us that FE mathematics teachers have diverse entry routes (Thompson & Hatfield, 2019; Orr & Simmons, 2010), face inadequate professional development (Drury, 2021; Sherwood, 2019), and develop through practice rather than training (Noyes & Dalby, 2020). The ETF (2014) demonstrates that collaborative approaches improve outcomes, with successful institutions featuring 'regularising staff meetings' and 'collaborative planning' (p.25).

We know teachers shift from 'creating mathematicians' to 'reducing mathematical anxiety' (Swain et al., 2005). We know they face significant salary differentials compared to alternative careers (Smith et al., 2017) yet persist, finding satisfaction in transformative moments with previously disengaged learners (Dalby & Noyes, 2016).

Noyes and Dalby (2020) documented that 'mathematics teaching teams typically include teachers from varied backgrounds with diverse skills and experience who have varied training needs depending on their entry route' (p.6). The recruitment crisis, almost nine in ten colleges struggling to recruit mathematics teachers (Belgutay & Martin, 2016), compounds challenges by limiting opportunities for experienced practitioners to mentor newcomers.

What Remains Unexplained

Despite this evidence, no research examines *how* shared professional identities emerge through workplace discourse processes. The ETF documented that collaborative planning correlates with improved outcomes—but this focus on structural conditions rather than meaning-making mechanisms leaves the actual social processes unexplored.

How do teachers from engineering, accountancy, and service industries—with no common pedagogical training—develop shared understanding of what 'good FE mathematics teaching' means? When Noyes and Dalby describe teaching teams with 'varied backgrounds' and 'varied training needs,' they identify the *condition* but not the *process*.

Specific questions remain unanswered:

- Through what conversational mechanisms do diverse professionals negotiate shared definitions of effective practice?
- How do corridor conversations about challenging learners become collective professional knowledge?
- What role does informal workplace discourse play when formal professional development proves inadequate?
- How do departmental meetings transform individual struggles into shared solutions?

Existing research on professional identity (Beijaard et al., 2004) focuses on individual development trajectories without examining how FE mathematics teachers develop *shared* professional identities through institutional discourse and community participation.

Why This Gap Matters

Individual professional identity formation cannot explain how teaching teams with diverse backgrounds develop coherent, coordinated approaches to complex pedagogical challenges. When 65% of apprentices report moderate-to-high mathematical anxiety (Johnston-Wilder et al., 2016) and learners carry generational narratives of mathematical avoidance (Thompson & Hatfield, 2019), the knowledge required exceeds individual capacity.

The sophistication of professional responses documented in Section 2.4 suggests knowledge constructed through shared problem-solving rather than discovered individually. Policy interventions targeting recruitment and retention (F.E. STEM bursaries, CfEM initiatives) assume that providing structural support automatically improves practice. Yet without understanding how professional meanings emerge through workplace conversation, such interventions may fail

to address the fundamental challenge: how do teachers collectively construct professional expertise when formal training proves inadequate and institutional support remains insufficient?

Research Objective 1 addresses this gap: How do FE mathematics teachers develop shared professional identities through collaborative conversations and institutional discourse within contexts of inadequate formal support and diverse professional backgrounds?

2.5.3 Gap 2: The Negotiation of Alternative Excellence

What We Know

Literature extensively documents externally imposed accountability measures and their consequences. Ball (2003, 2016) identifies how performativity transforms teaching into measurable performance, with FE mathematics teachers experiencing 'the terrors of performativity' where persistently low achievement rates position departments as failures. Biesta (2010) argues that mechanistic measurement focuses on what is measurable rather than educationally desirable. Bradbury (2019) documents how teachers experience 'moral distress' when institutional metrics force prioritisation decisions.

We also know teachers construct alternative success measures. Diamond (2020) describes transformative moments where learners 'had their heads held high, a stark contrast to the arrival.' The CfEM provides evidence of teachers at Nelson and Colne College measuring success through 'learner confidence improvement' rather than Grade 4 achievement (p.5). The ETF documents innovations like 'embedding the teaching of maths in vocational contexts' and 'working to improve mathematical resilience' (p.30). Noyes and Dalby's (2020) cross-case analysis shows teachers focusing on 'students' backgrounds, prior experiences, attitudes, and aspirations' (p.5) rather than achievement rates alone.

What Remains Unexplained

While literature documents both external accountability pressures and teacher-constructed alternatives, no research examines *how* teachers collectively negotiate alternative meanings of professional excellence through workplace conversations. The gap is not descriptive but processual, we know *that* alternative definitions exist but not *how* they emerge through social interaction.

Critical questions remain unanswered:

- How did teachers at Nelson and Colne College collectively decide 'learner confidence improvement' mattered more than Grade 4 achievement?

- Through what conversational processes did they negotiate this redefinition?
- How do such alternative definitions spread across professional communities, appearing consistently at multiple CfEM sites?
- What makes alternative quality indicators collectively legitimate when external accountability frameworks explicitly reject them?

Holstein and Gubrium's (2008) concept of institutional discourse negotiation suggests professional meanings emerge through ongoing workplace conversation. Yet existing research provides no framework for understanding this process in FE mathematics contexts where teachers must simultaneously acknowledge institutional accountability demands (Ball, 2016) while constructing alternative professional standards (Noyes & Dalby, 2020).

Vidal Rodeiro and Williamson's (2023) finding that curriculum intensification decreased outcomes for mid-range students, combined with Norris's (2023) evidence that students value 'familiarity' and 'opportunity to achieve' over qualification levels, suggests fundamental disconnect between policy-imposed and professionally-constructed quality indicators. Yet no research explains how teachers collectively negotiate this disconnect.

Why This Gap Matters

This gap prevents understanding of how professional communities sustain pedagogical commitment under conditions where institutional metrics systematically misrepresent their work. When performative accountability positions 20% achievement rates as failure (Hodgen et al., 2020) despite profound learner transformations (Diamond, 2020), teachers must collectively construct alternative professional meanings to maintain effectiveness.

Without understanding the social processes through which such negotiation occurs, we cannot explain professional resilience, how teachers continue developing sophisticated practice despite external frameworks that devalue their work. Policy assumes that intensifying accountability improves practice, yet evidence suggests the opposite (Vidal Rodeiro & Williamson, 2023).

Understanding how teachers collectively negotiate alternative definitions of excellence could inform accountability frameworks that align with rather than contradict effective practice. The consistency of alternative measures across multiple sites (CfEM, 2022) suggests systematic rather than idiosyncratic redefinition, yet existing research cannot explain this pattern without examining the workplace discourse through which professional communities construct shared meanings.

Research Objective 2 addresses this gap: How do teachers collectively negotiate meanings of professional excellence within policy constraints, constructing alternative quality indicators through workplace conversations that extend beyond externally imposed accountability metrics?

2.5.4 Gap 3: The Social Emergence of Pedagogical Innovation

What We Know

Teachers develop what Knowles et al. (2015) call 'responsive pedagogy', simultaneously addressing emotional, cognitive, and practical needs. Nixon and Cooper (2020) developed the 'Essential 8 programme,' focusing on eight core topics repeatedly rather than attempting comprehensive coverage. Kay (2020) created 'maths topic assessment grids' where 'learners became more focused on their individual learning journey rather than working competitively.'

Research documents contextualised teaching (Dalby & Noyes, 2018), radical differentiation (Tomlinson, 2014), technology integration (Luckin et al., 2012; Hoyles et al., 2010), and trauma-informed assessment (Nixon & Cooper, 2020). The CfEM synthesis documents innovations from 'goal-free questions' improving willingness and outcomes (p.16) to 'ratio tables' enabling previously unsuccessful learners to solve mathematical problems (p.5).

The ETF (2014) demonstrates that institutions featuring 'peer lesson observations' and 'collaborative planning' (p.25) show improved outcomes. Noyes and Dalby (2020) document systematic professional development networks across 32 colleges developing shared pedagogical strategies.

What Remains Unexplained

Existing research documents the *products* of pedagogical innovation without examining the *processes* through which distinctive teaching approaches emerge through collaborative problem-solving. The literature shows sophisticated practices exist but cannot explain how professional communities move from individual struggle to collective solution.

Specific unanswered questions include:

- When Nixon and Cooper describe how teachers 'asked themselves what are the essential core, big concepts students really need' (p.3)—how did this collective determination occur?
- Through what conversational mechanisms did they negotiate prioritising depth over breadth?

- Kay's 'much trial and error' suggests iterative refinement, but how did collective learning occur through this process?
- How do innovations like 'goal-free questions' or 'ratio tables' move from individual experimentation to community adoption?
- What role does workplace discourse play in validating, refining, and disseminating new approaches?

The documented curriculum coverage challenge with previously unsuccessful learners (Swan, 2006) cannot be addressed through individual pedagogical skill alone. Strategic prioritisation, identifying vocationally essential concepts such as, building confidence through achievable goals and accepting partial specification coverage, requires collective professional judgment about what constitutes effective practice in contexts where traditional measures prove inappropriate.

The consistency of innovations across multiple sites, the CfEM documents similar approaches at Nelson and Colne College, Leyton Sixth Form College, and elsewhere, suggests pedagogical knowledge spreads through professional networks rather than emerging independently. However, literature cannot explain the social processes enabling this diffusion.

This gap extends to understanding how teachers collectively navigate contradictory research evidence. When Luckin et al. (2012) document 45% increases in voluntary practice through adaptive platforms yet Hoyles et al. (2010) warn about surface learning through technology misuse, teachers face contradictory guidance requiring collective sense-making. Individual teachers cannot determine optimal technology integration through isolated trial-and-error; such learning requires shared workplace discourse where colleagues pool experiences and construct collective wisdom.

Why This Gap Matters

The pedagogical challenges FE mathematics teachers face, simultaneously addressing mathematical anxiety affecting 65% of apprentices (Johnston-Wilder et al., 2016), demonstrating vocational relevance, meeting accountability demands, compensating for inadequate resources, exceed individual teacher capacity. The sophistication of responses documented throughout Section 2.4 suggests collective construction through collaborative problem-solving rather than individual innovation.

Without understanding how pedagogical approaches emerge through workplace discourse, professional development initiatives risk providing tools without enabling the collaborative sense-making necessary for effective implementation. Swan's (2006) materials, Drury's (2018) Maths Mastery adaptations, Foster's (2013) diagnostic approaches provide frameworks, but teachers must collectively negotiate their implementation within local contexts.

The disconnect between policy intentions and student experiences (Norris, 2023; Vidal Rodeiro & Williamson, 2023) suggests teachers develop pedagogical responses that research has not yet theorised. How do professional communities construct approaches addressing student frustrations with policy-imposed qualification structures while maintaining effectiveness within accountability frameworks? This question cannot be answered without examining the collaborative meaning-making through which pedagogical innovation emerges.

Research Objective 3 addresses this gap: How do distinctive pedagogical approaches emerge through collaborative problem-solving within professional communities, enabling teachers to develop sophisticated responses to challenges that exceed individual capacity?

2.5.5 The Fundamental Limitation

These three gaps share a common limitation: existing research documents sophisticated professional practices without explaining the social processes through which they develop.

The literature demonstrates that FE mathematics teachers:

- Construct shared professional identities despite diverse backgrounds and inadequate training (Gap 1)
- Negotiate alternative definitions of professional excellence despite performative accountability (Gap 2)
- Develop distinctive pedagogical approaches despite resource constraints and complex learner needs (Gap 3)

Yet current research cannot explain *how* these collective achievements occur because it focuses on individuals rather than communities, outcomes rather than processes, structural conditions rather than meaning-making mechanisms.

This limitation is not merely descriptive but theoretical. Existing frameworks cannot adequately theorise professional knowledge development as fundamentally social, occurring through workplace discourse within institutional constraints.

Consider the evidence: The consistency of alternative success measures across multiple sites (CfEM, 2022). The systematic nature of professional networks (Noyes & Dalby, 2020). The documented correlation between collaborative approaches and improved outcomes (ETF, 2014). Together, these patterns suggest workplace discourse is not supplementary but essential to professional effectiveness in FE mathematics. Yet this central process remains theoretically and empirically unexplored.

The social constructivist framework established in Section 2.2 provides analytical tools for addressing these gaps. Wenger's (1998) concepts of mutual engagement, joint enterprise, and shared repertoire enable investigation of how professional meanings emerge through collaborative practice. Holstein and Gubrium's (2008) institutional discourse analysis explains how such meanings are negotiated within, not outside, structures of institutional power.

Understanding these processes matters because policy interventions targeting FE mathematics, the recruitment initiatives, professional development programmes and accountability reforms, assume certain mechanisms of professional learning that may not align with how teachers develop expertise. Without examining the workplace discourse through which professional meanings emerge, we cannot design support structures that work with rather than against natural processes of collective professional development.

2.6 Chapter Summary: From Literature to Investigation

2.6.1 Five Core Arguments

This literature review has established five key arguments providing the foundation for empirical investigation:

1. Policy creates implementation gaps necessitating collective response. The mandatory resit policy exemplifies enactment without adequate implementation capacity (Ball, 2016), creating pedagogical impossibilities (covering 50 topics in 30 weeks with previously unsuccessful learners), professional invisibility (confidence-building work uncaptured by accountability metrics), and systemic capability gaps (recruitment crises affecting 90% of colleges). Individual teacher expertise cannot address these structural failures; teachers must develop collective responses through workplace discourse.

2. Performativity systematically misrepresents professional work. Ball's (2003, 2016) analysis, combined with Coffield's (2008) critique of managed professionalism, reveals how FE mathematics teachers operate under accountability frameworks measuring only Grade 4 achievement while dismissing as valueless the time-intensive work of addressing mathematical

anxiety, rebuilding confidence, and demonstrating vocational relevance. When formal accountability renders professional work invisible, teachers must collectively construct alternative quality indicators through workplace negotiation.

3. Adult learner characteristics create compound professional challenges. Mathematical anxiety affecting 65% of apprentices (Johnston-Wilder et al., 2016), generational narratives of mathematical avoidance in post-industrial contexts (Thompson & Hatfield, 2019), and compound anxiety from repeated failure (Nixon & Cooper, 2020) create pedagogical challenges exceeding individual teacher capacity. Collaborative expertise development becomes necessity rather than enhancement.

4. Teachers construct alternative definitions of professional excellence. Evidence from CfEM (2022), ETF (2014), and Noyes and Dalby (2020) demonstrates that teachers develop quality indicators extending beyond Grade 4 achievement to encompass confidence improvement, engagement, and mathematical resilience. Yet research cannot explain the social processes through which such alternative definitions emerge and achieve legitimacy within professional communities.

5. Professional expertise develops through collaborative discourse rather than formal training. The diversity of entry routes (Noyes & Dalby, 2020), inadequacy of professional development (Drury, 2021; Sherwood, 2019), and documented correlation between collaborative approaches and improved outcomes (ETF, 2014) suggest professional knowledge emerges through workplace conversation rather than individual skill acquisition or institutional guidance.

2.6.2 Three Critical Gaps

These arguments reveal a fundamental limitation: existing research documents sophisticated professional practices without explaining the social processes through which they develop.

Gap 1 concerns how diverse professionals become 'FE maths teachers.' When engineers, accountants, and industry professionals enter teaching with no common training, how do they develop shared understanding of their role? Existing research on professional identity focuses on individual trajectories without examining how teaching teams develop *shared* professional understanding through institutional discourse.

Gap 2 concerns how teachers collectively negotiate alternative meanings of professional excellence within constraining accountability frameworks. While literature documents both performative pressures and teacher-constructed alternatives, no research examines the

workplace conversations through which such alternative definitions emerge, achieve legitimacy, and spread across professional communities.

Gap 3 concerns how distinctive pedagogical approaches emerge through collaborative problem-solving. Research extensively documents innovations yet provides no framework for understanding the collaborative discourse through which professional communities move from individual struggle to collective solution.

These gaps matter because they prevent understanding of how professional communities sustain pedagogical commitment under conditions where institutional metrics systematically misrepresent their work. Policy interventions assume mechanisms of professional learning that may not align with how teachers actually develop expertise.

2.6.3 What Comes Next

This literature review has demonstrated that FE mathematics teaching occurs within impossible conditions: policy constraints and performative pressures (2.3.1-2.3.3), institutional marginalisation (2.3.4), and adult learner complexities (2.3.5). Teachers respond by constructing professional identities (2.4.1), negotiating quality standards (2.4.2), and developing pedagogical expertise (2.4.3).

Yet the social processes through which these collective achievements occur remain unexplored.

This investigation addresses these critical gaps by examining workplace discourse and community participation as sites where professional meanings are actively constructed. Rather than assuming professional knowledge develops through formal training or individual reflection, this research investigates the collaborative sense-making through which FE mathematics teachers collectively construct professional identity, negotiate standards of excellence, and develop pedagogical approaches within challenging institutional contexts.

The following methodology chapter establishes the research approach designed to investigate these processes. It explains how semi-structured interviews enable examination of workplace discourse, how thematic analysis guided by the communities of practice framework reveals meaning-making mechanisms, and how the North East England context provides a critical case for examining collaborative professional development in post-industrial regional contexts.

The methodology demonstrates how this investigation's design aligns with its theoretical positioning, enabling rigorous empirical examination of the social processes through which

professional meanings emerge in FE mathematics teaching, the fundamental question existing research has failed to address.

The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Chapter 3: Methodology

Chapter 3: Methodology

3.1.1 Introduction

Chapter 2 identified three critical gaps in existing research: how diverse professionals develop shared identities (Gap 1), how teachers negotiate alternative quality standards (Gap 2), and how pedagogical expertise emerges through collaboration (Gap 3). This chapter establishes the methodological approach for investigating these collective meaning-making processes. Drawing on practitioner accounts documented in the Times Educational Supplement, one Hartlepool College team moved GCSE resit achievement rates from 17% to 46% over three years (Kay, 2020). This case highlights a remarkable shift not just in results but in how they achieved them. The achievement rates matter, they affect 200,000 students retaking mathematics annually, but what's truly significant is *how* they achieved them. Teachers worked together developing shared assessment strategies, collectively redefining success beyond Grade 4 achievement, constructing alternative professional meanings through ongoing workplace conversation.

Rather than measuring practice against external standards or evaluating policy effectiveness through quantifiable outcomes, this methodology prioritises understanding what experienced practitioners do when working with learners whom traditional approaches have repeatedly failed. The research design deliberately centres practitioner voices and classroom experiences over institutional metrics (following Stenhouse's practitioner research tradition), recognising that effective educational practice often emerges through collective professional wisdom (Lave & Wenger, 1991) rather than performance indicator compliance. The ETF (2014) documented similar collaborative innovations across 51 institutions. The CfEM (2022) synthesis showed 21 colleges developing sophisticated shared practices. Yet despite documenting what teachers do collaboratively, we don't understand how these professional meanings emerge through workplace discourse. When teachers describe developing distinctive pedagogical approaches (what participants termed 'goal-free questions' and 'responsive teaching systems'), what social processes enable such collective meaning-making to occur, this research investigates how departmental conversations can transform individual struggles into shared solutions.

This methodology chapter addresses those questions. Drawing on the researcher's experience as a former Head of Mathematics, the study was designed to capture collective meaning-making while acknowledging insider-outsider positioning. The challenge is straightforward, much of what matters in teaching happens in spaces we can't easily observe, corridor conversations, informal department talk, the networks through which teachers actually share ideas. Direct observation simply isn't practical here, instead, we use interviews differently. The researcher treats them as moments where teachers articulate the collective understandings that already

shape how they work. What emerges in these conversations is real professional knowledge, not individual opinions, but the shared meanings teachers have negotiated together over time. By listening carefully to how individual teachers talk, the investigation gains access to the collective sense-making that actually drives their practice.

This chapter proceeds as follows: Section 3.2 establishes the philosophical foundations for investigating socially constructed professional knowledge. Section 3.3 addresses the researcher's positioning as both insider and outsider, examining how this shapes access to and interpretation of collective discourse. Sections 3.4-3.5 detail data collection and analysis procedures. Sections 3.6-3.7 address research quality and ethical considerations.

The study investigates how professional knowledge emerges through social processes rather than individual reflection. The primary research question operationalises this investigation by examining the specific contexts and interactions through which FE mathematics teachers construct shared meaning and practice. This question is addressed through three interconnected research objectives that guide both data collection and analysis.

Primary Research Question:

'How do FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and community participation?'

This question is addressed through three interconnected research objectives:

Research Objective 1 (RO1): Building Professional Identity Together - What processes enable FE mathematics teachers to collectively develop their sense of professional identity through departmental conversations and shared experiences, and how do these processes shape shared understandings of what it means to teach mathematics to struggling learners?

Research Objective 2(RO2): Creating Shared Standards of Excellence - What mechanisms do FE mathematics teachers employ to collectively navigate policy and organisational demands, and through what workplace processes do they establish shared definitions of good practice and professional success?

Research Objective 3 (RO3): Developing Teaching Expertise Through Community - Through what collaborative processes do distinctive pedagogical approaches and teaching strategies emerge in FE mathematics teaching, and how do teachers adapt and integrate shared expertise into their individual practice?

3.1.2 Methodological Alignment with Research Objectives

This methodology directly addresses the three research objectives established in Chapters 1 and 2. The research objectives demand methodological approaches capable of capturing collective meaning-making processes that occur through informal workplace interaction.

Research Objective 1 (RO1): Building Professional Identity Together - Understanding how professional identity develops collectively requires access to the shared narratives, common language, and mutual understandings that circulate through professional communities. Semi-structured interviews, rather than surveys or questionnaires, enable researchers to explore how individual teachers position themselves within these collective discourses, articulating not just personal identity but the identities their communities construct together. Following Kvale and Brinkmann (2009), interviews create dialogic spaces where meaning emerges through conversation, mirroring the workplace conversations through which professional identity actually forms. This approach privileges depth over breadth, necessary for investigating the nuanced interplay between individual experience and collective positioning.

Research Objective 2 (RO2): Creating Shared Standards of Excellence - Teachers' negotiations of quality standards occur through departmental conversations, policy discussions, and sector-wide dialogue. Individual interviews cannot observe these processes directly due to practical constraints. However, treating interviews as occasions where teachers articulate the negotiated standards their communities have collectively constructed makes these collective processes visible. A survey approach would miss the relational and discursive nature of standard-setting; interviews capture how individual teachers have internalised and interpret collectively negotiated meanings about excellence.

Research Objective 3 (RO3): Developing Teaching Expertise Through Community - Pedagogical expertise circulates through professional communities via shared strategies, collaborative problem-solving, and collective learning. Thematic analysis, adapted to identify collective rather than individual themes (Braun & Clarke, 2019), enables tracking of how shared pedagogical approaches emerge across multiple teacher accounts, revealing patterns of expertise circulation that individual case studies would obscure. This analytical choice directly enables investigation of community-level knowledge development.

The theoretical framework (social constructivism), research focus (collective meaning-making), and analytical procedures (identifying shared discourse patterns, collective themes, community-referenced meaning) form a coherent investigation strategy. Data collection through interviews captures individual accounts of collective processes; analysis identifies the patterns suggesting community-level meaning-making.

3.2 Research Philosophy & Design

3.2.1 Ontological Position: Social Construction of Professional Reality

The researcher adopts a social constructivist ontology for this investigation, recognising that professional practice in FE mathematics teaching is not individually created but emerges through ongoing social interaction within institutional contexts. While Berger & Luckmann (1966) established foundational social constructivist thinking, Crotty (1998) provides a more nuanced framework distinguishing between subjective and objective social reality, a distinction crucial to this study. This positioning reflects the researchers two decades of experience within FE, during which they observed how departmental conversations, not individual teacher decisions, shaped collective understanding of what constitutes effective practice .Professional meanings about what constitutes effective teaching, appropriate pedagogical responses, or legitimate success measures exist as shared social realities constructed and maintained through workplace discourse, collaborative problem-solving, and community participation.

This social constructivist positioning is complemented by Lave and Wenger's (1991) framework of communities of practice, which highlights how professional knowledge develops through participation in communities bound by mutual engagement, joint enterprise, and shared repertoires. While Berger and Luckmann focus on the macro-social construction of reality, Lave and Wenger provide specificity about how that construction occurs within professional communities through situated learning and legitimate peripheral participation. In FE mathematics teaching contexts, this means pedagogical approaches, assessment strategies, and professional identities aren't transmitted from individual experts to novices but develop collaboratively through ongoing participation in departmental and sector-wide professional communities. The distinction between subjective individual beliefs (what one teacher thinks) and objective social reality (what the department collectively understands) becomes visible when examining how teachers construct meaning together through mutual engagement with common problems and shared professional concerns. This differs from both positivist positions (which assume objective teaching realities independent of social interpretation) and radical relativism which reduces everything to individual perspectives.

Following Crotty (1998), this research acknowledges that while meaningful reality is socially constructed, it maintains objective existence within professional communities. When FE mathematics teachers describe concepts such as 'mathematical trauma' or 'responsive pedagogy,' they reference real professional knowledge that circulates through institutional

conversations and sector-wide discourse (Bathmaker, 2019; Hodgson & Spours, 2017). This knowledge shapes how teachers collectively understand and implement their practice.

This ontological position recognises that individual teachers operate within what Wenger (1998) terms 'communities of practice', professional groups that develop shared repertoires, mutual engagement patterns, and joint enterprises. Teachers do not invent professional responses individually, they inherit, adapt, and collectively negotiate meanings within these communities (Wenger, 1998). Understanding FE mathematics teaching therefore requires examining the social processes through which professional communities construct and maintain shared understanding (Lave & Wenger, 1991), rather than focusing on individual teacher cognition or decision-making.

3.2.2 Epistemological Position: Knowledge Through Collective Discourse

Having established the ontological position above (that professional realities are socially constructed), this section addresses the epistemological question: how can such collective meanings be known and investigated? Epistemologically, this research positions professional knowledge as emerging through what Holstein and Gubrium (2008) term 'institutional discourse'

Epistemologically, this research positions professional knowledge as emerging through what Holstein and Gubrium (2008) term 'institutional discourse', the ongoing conversations through which professional communities negotiate meanings within constraining policy frameworks. Knowledge about effective FE mathematics teaching doesn't reside in individual teacher cognition but circulates through workplace interactions: informal corridor conversations about challenging classes, departmental meetings negotiating scheme of work priorities, regional professional development networks sharing resources, and sector-wide discussions about mandatory resit policies.

This epistemological stance has methodological implications. Research cannot access collective meaning-making by studying isolated individual teachers or measuring practice against external standards. Instead, it requires examining how teachers draw upon, reproduce, and adapt shared professional discourse when describing their work. Even in individual interviews, teachers speak from socially situated positions, using language shaped by professional communities, referencing collective experiences, and articulating understandings negotiated through workplace participation.

This philosophical foundation enables deep engagement with participant perspectives, recognising subjective meanings within educational settings. Following Weber's concept of

'verstehen,' this approach treats teachers' professional meanings as situated within particular social and institutional contexts (Lave & Wenger, 1991). The researcher's FE background enables recognition of 'thick description' (Geertz, 1973) of participant perspectives, facilitating what Gadamer (1975) terms the 'fusion of horizons' where researcher and participant perspectives merge to create deeper understanding. This interpretive framework acknowledges how subjective meanings and practical logic shape teaching practice (Bourdieu, 1977).

This interpretive epistemological position is crucial for investigating collective meaning-making because it positions the researcher as capable of understanding not just individual accounts but the shared professional knowledge circulating through communities. Rather than treating interviews as transparent windows into objective teaching reality, this approach recognises interviews as sites where collective discourse becomes visible and analysable. Teachers' language, metaphors, narrative structures, and institutional references reveal the professional communities shaping their understanding.

3.2.3 Methodological Challenge: Accessing Collective Meanings Through Individual Accounts

The central methodological challenge in social constructivist research is accessing collective meaning-making processes when practical constraints limit direct observation of workplace interaction. This research addresses this challenge by treating individual interviews as sites where collective professional discourse becomes visible through teachers' accounts of their practice.

This epistemological positioning presents a central methodological challenge: How can collective meaning-making processes be investigated when practical constraints prevent direct observation of workplace interactions? Teachers' professional knowledge circulates through informal corridor conversations, departmental meetings, lunch-time discussions, and regional professional networks, moments difficult to directly observe or record. The research therefore required a methodological approach that could access collective discourse indirectly, through how teachers articulate and draw upon shared professional knowledge when describing their practice.

Holstein and Gubrium (2016) argue that interviews are not simply data extraction events but 'occasioned sites' where participants actively construct accounts using culturally available narratives and institutionally shaped discourse. When FE mathematics teachers describe their teaching approaches, they don't report purely personal inventions but draw upon shared

professional language developed through departmental conversations, common metaphors circulating within FE mathematics communities (such as 'mathematical trauma' or 'responsive pedagogy'), collective narratives about learner characteristics and institutional constraints, and institutionally negotiated understandings of professional success. The analytical task therefore becomes identifying which aspects of teachers' accounts reflect collective discourse rather than individual perspective.

To access collective meaning-making through individual interviews, analysis employed four analytical indicators. These indicators signal when teachers are drawing upon shared professional discourse rather than articulating purely individual perspectives or experiences. Each indicator reflects a different dimension of how professional communities construct and circulate knowledge, analysis distinguished individual from collective meanings through attention to four key indicators. First, shared language patterns: when multiple teachers independently used identical phrases such as 'rebuilding confidence,' 'contextualising for relevance,' 'meeting them where they are', this indicated circulation through professional discourse rather than individual creation. Second, collective narratives such as when teachers told structurally similar stories about departmental responses to policy pressures, this revealed shared sense-making within professional communities. Third, institutional discourse markers with phrases like 'we found that...,' 'the department decided...,' 'our approach is...' explicitly referenced collective processes rather than individual decision-making. Fourth, professional community references, when teachers described learning approaches from colleagues, adapting departmental resources, or participating in sector-wide initiatives, they made visible the social processes through which expertise develops.

These analytical indicators are possible to identify in interview data precisely because semi-structured interviews function as what Holstein and Gubrium (2016) term 'occasioned sites.' Participants actively construct accounts using culturally available narratives and institutionally shaped discourse. By attending to these four dimensions, the analysis reveals not just what teachers do individually, but how they draw upon, adapt, and collectively negotiate professional knowledge through workplace participation.

Following Wenger's (1998) communities of practice framework, analysis examined how teachers positioned themselves within professional communities. This framework is particularly useful for analysing interview data because it identifies three dimensions through which professional communities maintain shared understanding. First, mutual engagement, the ongoing interaction and relationships through which community members connect. Second, joint enterprise, the

shared goals, challenges, and responses that define the community's purpose. Third, shared repertoire, the collective resources, language, tools, strategies, and approaches that community members draw upon and develop together.

In interview analysis, these three dimensions became visible when teachers referenced: (1) collaborative planning, shared problem-solving, and informal conversations (mutual engagement); (2) common challenges, collective responses to policy demands, and departmental initiatives (joint enterprise); and (3) shared terminology, common pedagogical strategies, sector-wide resources, and collective understandings of effective practice (shared repertoire). For example, when multiple teachers across different institutions described similar approaches to 'building resilience' in resit students, analysis traced whether this represented shared sector discourse (common repertoire) or coincidental similarity. This involved identifying mutual engagement indicators (references to collaborative planning, shared problem-solving, informal conversations), joint enterprise markers (common goals, shared challenges, collective responses to institutional demands), and shared repertoire evidence (common tools, strategies, language, and approaches circulating within professional groups). For example, when multiple teachers across different institutions described similar approaches to 'building resilience' in resit students, analysis traced whether this represented shared sector discourse or coincidental similarity.

This methodological approach acknowledges limitations; it cannot directly observe workplace interactions or capture all forms of collective meaning-making. However, it provides systematic access to how teachers draw upon collective professional knowledge when articulating their practice, revealing the social construction processes central to this investigation

3.3 Researcher Positionality in Studying Collective Processes

This section examines how the researchers positioning as both insider to and outsider from FE mathematics communities shapes the research. This reflexive attention is essential for social constructivist research where the researcher participates in the professional discourse communities under investigation (Bourdieu, 1990; Herr & Anderson, 2014).

The researcher brings twenty years' experience within Further Education, including roles as Lead Practitioner, Engagement Curriculum Lead, Head of Mathematics, and current Initial Teacher Trainer. This background positions them as both insider to and outsider from the professional communities being investigated. Having spent two decades observing how professional expertise circulates informally through FE departments, the researcher recognised that

interviews could access these processes by focusing on shared discourse patterns rather than individual opinions. This dual role of practitioner-researcher, as conceptualised by Herr and Anderson (2014), presents both unique opportunities and challenges requiring careful methodological consideration.

As a former FE mathematics teacher and current teacher educator, the researcher recognises the sector-specific discourse that would puzzle external researchers unfamiliar with FE contexts (Dwyer & Buckle, 2009). Participants spoke colleague-to-colleague rather than explaining their world to outsiders, creating what Rapley (2001) identifies as the 'collaborative production' of meaning through shared understanding. This insider positioning created epistemological advantage: participants' implicit assumption, the taken-for-granted knowledge circulating through their professional communities, became analytically visible. This access came with risks particularly over-identifying with participants, assuming shared meanings, interpreting through personal experience rather than their words. This positioning facilitated recognition of when teachers referenced shared experiences or drew upon common sector knowledge, enabling deeper engagement with collective meaning-making processes.

Insider status also required explicit attention to managing potential sources of analytical bias, not to diminish the genuine epistemological advantages of insider positioning, but to ensure methodological rigor. While the researcher’s familiarity with FE contexts enabled recognition of sector-specific discourse patterns, it created potential for confirmation bias, seeing convergent professional meanings where variation actually existed, or over-identifying with participant perspectives rather than attending carefully to what they actually articulated (Merriam & Tisdell, 2016). Familiarity with FE mathematics contexts created tendency to interpret ambiguous statements through personal experience rather than attending carefully to what participants actually said. Perhaps most significantly, the researcher’s insider knowledge risked assuming meanings were universally shared across the Northeast FE sector when they might vary substantially across different institutional types and contexts (Merriam & Tisdell, 2016). A college in a post-industrial town might construct professional meanings differently from a specialist provider or sixth form college, yet familiarity with Northeast contexts could obscure these differences for the researcher. Managing this required systematic attention during analysis to distinguishing between sector-wide professional discourse patterns and meanings specific to particular institutional contexts

To manage these challenges, the researcher employed systematic reflexive practices. Regular supervisory consultation challenged insider assumptions, pushing distinction between explicit

participant statements and inferred meanings. Member checking focused specifically on whether teachers recognised collective patterns identified in analysis, testing whether interpretations resonated with participants' experience of their professional communities. Particular attention was paid to discrepant cases that challenged assumed professional consensus, ensuring analysis didn't impose artificial homogeneity on diverse institutional contexts.

This reflexive approach acknowledges that the researcher participates in the professional discourse communities under investigation (Bourdieu, 1990; Herr & Anderson, 2014) while maintaining the analytical stance necessary for systematic inquiry. Drawing on Ravitch and Carl (2020), 'critical subjectivity' was employed, leveraging insider knowledge while consciously interrogating how this positioning shapes interpretation, as a methodological strength rather than a limitation to overcome. This aligns with what Finlay (2002) describes as 'reflexive engagement,' where the researcher's positioning is transparently examined and becomes part of the analytical process.

3.4 Data Collection Methods

3.4.1 Semi-structured Interviews Design

Semi-structured interviews were chosen as the primary data collection method (Horrocks et al., 2012; Mason, 2018) specifically because they create conditions where collective professional discourse becomes visible. Unlike narrative interviews focused on individual life stories or phenomenological interviews exploring personal experience, semi-structured interviews enable teachers to articulate both their situated experiences and the shared professional language, metaphors, and understandings circulating through their communities. Following Holstein and Gubrium's (2016) 'active interviewing' framework, this research treats interviews as occasions where teachers make visible the collective meanings, shared language, and institutional narratives that shape their professional communities.

Interview Design Rationale: The interview protocol was designed to elicit teachers' articulation and use of collective professional discourse rather than purely personal accounts. Aligned with the three research objectives established in Section 3.1, questions were structured to prompt teachers to:

- Describe how their department collectively addresses challenges
- Explain approaches they've adopted from colleagues or professional networks
- Reference institutional conversations about policy implementation

- Articulate shared understandings within their professional community
- Discuss how meanings of 'effective practice' are negotiated in their workplace

These question domains directly address: (RO1) how professional identity is collectively constructed through departmental conversations and shared experiences; (RO2) how standards of excellence are negotiated through institutional discourse and policy navigation; and (RO3) how pedagogical expertise emerges through collaborative problem-solving and community participation. The interview duration and structure were designed to optimise data richness while managing participant fatigue (Mason, 2018). This timeframe allows sufficient depth to explore how teachers draw upon shared professional language and collective narratives without overwhelming participants managing intensive FE teaching schedules. Each 45–60-minute interview explores six domains each directly addressing the three research objectives examining collective professional identity formation, socially negotiated standards, and pedagogically developed expertise through community participation

- Personal Journey and Professional Behaviours
- Challenges, Expectations & Managing Behaviour.
- Classroom Approaches and Adaptive Teaching.
- Subject Knowledge & Subject Curriculum.
- Assessment
- Additional/ Suggestions to Improve Maths Teaching & Learning

Domain 1 (RO1 - Professional Identity): - What led you to get into teaching? What have you done prior to teaching? - Why maths? Why FE? - What are your core responsibilities for teaching maths? Are you able to achieve this?

Domain 2 (RO1 & RO2 - Challenges and Departmental Responses): - - What led you to get into teaching? What have you done prior to teaching? - Why maths? Why FE? - What are your core responsibilities for teaching maths? Are you able to achieve this?

Domain 3 (RO3 - Pedagogical Approaches): - Before teaching, what are the factors that need to be considered when teaching maths in FE? What approach do you take to teach maths? Could you explain your understanding of this approach? - What are the challenges/successes of this approach? Are you able to move away from it if needed?

Domain 4 (RO2 & RO3 - Subject Knowledge and Curriculum): - What maths qualification is it that you teach? What do you think makes teaching maths effective? How do you develop your subject knowledge? What training, mentoring, or support have you had?

Domain 5 (RO2 - Assessment and Standards): - What are the main considerations for assessment in the classroom? What are the challenges of assessment with your learners? What do you think the perception of maths/maths teachers is within your organisation?

Domain 6 (RO1, RO2, RO3 - Professional Development and Collective Improvement): - What brings you joy in your teaching and learning? What are the biggest successes and challenges of teaching maths? What do you think should be done to improve maths teaching and learning locally and nationally?

The interview protocol was informed by Holstein and Gubrium's (2016) principles of active interviewing, which recognise interviews as sites where participants draw upon and articulate collective professional discourse. Questions were designed to prompt teachers to reference workplace conversations, departmental practices, and shared professional understandings rather than purely personal beliefs or individual experiences. The researcher's insider-outsider positioning (discussed in section 3.3) shaped interview design in specific ways. Teachers often began responses with phrases like 'Well, you know how it is...' or 'As you'll remember from your time...', assuming shared understanding. This colleague-to-colleague communication demonstrated the trust and rapport necessary for authentic data collection. Rather than providing a clinical formal testimony, participants felt comfortable articulating genuine challenges, frustrations, and contradictions (Finlay, 2002). However, this insider positioning required careful probing during interviews to make implicit knowledge explicit and analysable. When teachers referenced 'what we always do' or 'how things work here,' the researcher needed to prompt specificity, ‘what exactly did 'we' do? Which people make up this 'we'? What would someone unfamiliar with the context need to understand? This approach ensured that analytical interpretations were grounded in explicit participant statements rather than assumptions about shared meanings

3.4.2 Sampling Strategy

Purposive sampling was used to select ten mathematics teachers who could provide rich insights into collective meaning-making processes. Following Patton's (2015) concept of 'information-rich cases,' teachers with at least three years' FE experience were sought, currently employed in Northeast institutions and teaching across multiple qualification types. This wasn't sampling for

statistical representativeness, impossible with ten participants, but for depth and diversity of experience within professional communities. The researcher needed teachers who had participated long enough in workplace discourse to reveal patterns of collective meaning-making.

Participant selection followed rigorous criteria developed through synthesis of relevant literature and sector-specific considerations. Essential eligibility requirements included a minimum of three years' mathematics teaching experience in FE, current employment within a Northeast institution, and demonstrable experience across multiple qualification types. These criteria were established to ensure participants possessed sufficient depth of experience to provide meaningful insights into the complexities of FE mathematics teaching, while maintaining what Lincoln and Guba (1985) term ‘credibility’ through current sector engagement.

Recruiting participants proved challenging due to intensive FE teaching workloads. Flexible scheduling (including evening and weekend options) was offered, and the researcher offered to travel to participants' institutions rather than expecting them to come to a central location. This practical accommodation reflected the compressed nature of FE timetabling (Thompson, 2018) and acknowledged that mathematics teachers often teach across multiple campuses within a single day. The sampling framework was deliberately constructed to capture diverse FE provision. Institutional representation spanned Further Education Colleges, Sixth Form Colleges, Specialist Providers, and Training Organisations (Gleeson et al., 2015). Geographic distribution included city centre, rural, coastal, and post-industrial communities across Northeast England, acknowledging the 'situated nature' of educational practice within specific socio-economic contexts (Ball et al., 2012). Interview scheduling required careful negotiation around peak marking periods, examination weeks, and institutional quality processes, particularly for participants teaching GCSE resit programmes.

Career stage diversity was particularly important as professional knowledge construction varies according to the social contexts teachers inhabit. Early-career teachers may construct professional meanings primarily through formal mentoring relationships and structured professional development, while experienced practitioners may rely more heavily on informal workplace conversation and peer collaboration. Teachers who entered FE through traditional education routes may construct professional identity differently from those with industry backgrounds, reflecting different professional communities and discourse patterns. This diversity enables understanding of how professional meanings emerge through various forms of social interaction and institutional participation.

Professional background diversity was particularly emphasised in the sampling strategy. The sample deliberately included industry-experienced practitioners who brought vocational expertise, career teachers with decades in FE, subject specialists with strong mathematical backgrounds, and those teaching across both GCSE and vocational contexts. This diversity captures what Noyes et al. (2021) describe as 'multiple professional perspectives', crucial because comparing GCSE Maths with vocational mathematics teaching reveals different pedagogical approaches and institutional positioning. The geographical area is a growth area for digital and manufacturing engineering provision, with vehicle and pharmaceutical manufacturers alongside software development institutes making up a large proportion of local employment, which influenced both participant availability and teaching commitments.

3.4.3 Implementation Process and Data Collection

Data collection followed BERA (2024) ethical guidelines and established qualitative research practices in Further Education settings. Where feasible, interviews were conducted within participants' institutions, recognising the importance of institutional context in shaping practitioners' experiences (Dennis, 2016; Hammersley, 2017).

Individual interviews lasted 45-60 minutes, a duration that optimises data richness while managing participant fatigue (Mason, 2018). The interviews were structured yet conversational, designed to elicit authentic professional discourse rather than formal testimony. Scheduling accommodated the cyclical demands of the FE academic year (Cohen et al., 2018), particularly the intensive assessment periods characteristic of GCSE resit programmes.

Documentation protocols ensured trustworthiness through multiple data sources (Lincoln & Guba, 1985). Digital recordings captured interview content with explicit participant consent, while field notes documented contextual elements that Silverman (2017) identifies as crucial but often missed in audio data. The researcher noted paralinguistic features and contextual shifts: Participant 7's lowered voice when discussing management pressures, Participant 3's laughter during Ofsted inspection descriptions, Participant 5's transition from collective institutional language ('we found that...') to personal frustration ('but I couldn't...'). These field note observations revealed tensions between collective professional discourse and individual experience that transcription alone would not capture. As discussed earlier, the participants involved must feel comfortable in their surroundings and must know that their view is valuable to achieve rich and valuable data. Post-interview reflective documentation enabled what Schon (1991) terms ‘reflection-on-action’, enriching data analysis through captured researcher insights and observations.

Data collection was conducted using BERA (2024) ethical guidelines. Interviews were initially planned for face-to-face delivery in participants' institutions but adapted to remote delivery via Microsoft Teams due to COVID-19 restrictions. This platform was selected for its widespread use in FE settings and security features. Remote interviews proved effective, with participants speaking candidly in their home environments. Data security followed stringent protocols with encrypted, password-protected storage. Digital recordings and field notes were retained for analysis; audio files were deleted after transcription verification. All data will be stored securely and then destroyed according to institutional research governance policies.

The intention of this research study is to investigate the standards in which teachers themselves practice their vocation, what brought them to the role and why, what is their approach to meet standards of practice and what do they see as the objectives of their role. This comprehensive implementation approach demonstrates what Duckworth and Smith (2018) term ‘methodological integrity’, ensuring alignment between sector-specific requirements and academic rigour, while maintaining sensitivity to participants' professional contexts. The implementation of data collection followed protocols aligned with BERA (2024) ethical guidelines. Initially designed for face-to-face interviews within participants' institutions, the research adapted to remote delivery via Microsoft Teams due to COVID-19 restrictions, chosen for its widespread use in FE settings and enhanced security features. This transition required additional technical considerations: providing comprehensive guidance before interviews, platform familiarisation sessions where needed, establishing backup recording protocols and contingency plans for technical failures, and maintaining privacy in home-working environments. While remote interviewing initially raised concerns about losing authentic institutional context, it ultimately proved effective. Teachers spoke candidly from their home offices, perhaps more relaxed than they might have been in institutional settings under management surveillance

3.5 Data Analysis Framework

3.5.1 Analytical Approach

Data analysis employs reflexive thematic analysis (Braun & Clarke, 2019), adapted for identifying collective meaning-making processes. Rather than treating interview data as windows into individual teacher cognition, analysis attended to how teachers drew upon shared professional discourse when describing their practice. This required listening differently than traditional thematic analysis, not just for what teachers said but for linguistic markers indicating collective rather than individual knowledge construction. The approach enables systematic engagement with data while maintaining sensitivity to sector-specific considerations (Mason, 2018; Smith et

al., 2009), acknowledging how the researcher, as a former Head of Maths in FE and current Initial Teacher Trainer, interpretatively engages with participants' own interpretations of their teaching experiences.

Analysis began by reading and re-reading interview transcripts multiple times, noting initial patterns and questions. When teachers described their teaching approaches or student engagement challenges, attention was paid not just to what they said but how they made sense of these experiences within their institutional context. This orientation to participants' standpoint will facilitate what Bathmaker (2019) terms ‘contextual understanding’ recognising how knowledge and meaning are constructed within specific FE settings characterised by competing demands around vocational integration, assessment requirements, and student support needs.

Data management protocols demonstrate rigorous adherence to both BERA (2024) ethical guidelines and sector-specific considerations identified by O'Leary and Smith (2019) for research within Further Education contexts. Given the potentially sensitive nature of discussing institutional practices and professional challenges in FE mathematics teaching, a robust ethical framework is essential. This includes obtaining informed consent from all participants, ensuring they understand their right to withdraw at any stage, and maintaining confidentiality particularly given the close-knit nature of FE mathematics teaching communities in the Northeast region. The data collection and storage process encompass several key elements to ensure both ethical compliance and research validity. All ten semi-structured interviews are transcribed verbatim to ensure accurate representation of participants' voices, with systematic integration of field notes recorded during and immediately after each interview to capture contextual observations and initial analytical insights. Data security is maintained through encrypted digital storage with password protection, aligning with current research governance requirements. To protect individual and institutional identities, a system to anonymise participant personal data is implemented, designating interviewees as Participants 1-10 in all research documentation.

To enhance methodological rigour and trustworthiness, member checking procedures are employed where participants are invited to review their interview transcripts and emerging interpretations. An analyst triangulation approach through peer review of coding and theme development is utilised to enhance interpretative reliability. These protocols acknowledge the dual responsibility of protecting participant confidentiality while ensuring methodological rigour. The approach aligns with what Bathmaker (2019) identifies as best practice in FE practitioner research, where maintaining professional relationships and trust is particularly crucial given the researcher's own positioning within the regional FE mathematics teaching community. All data

will be stored securely for the required retention period and then appropriately destroyed in accordance with institutional research governance policies. This comprehensive approach to data management provides transparency about the specific procedures while acknowledging the sensitivities of researching within the FE sector. It demonstrates awareness of both ethical obligations and methodological requirements for robust qualitative research in educational settings.

3.5.2 Coding Process

The coding strategy incorporates multiple analytical levels, reflecting what Smith and O'Leary (2015) identify as the multilayered nature of FE mathematics teaching practice. The process follows two distinct phases of analysis to ensure both depth and theoretical sophistication. First-level coding includes descriptive coding of teaching approaches and pedagogical strategies, process coding to capture implementation methods, in vivo coding to preserve practitioners' authentic voice, and contextual coding to understand institutional factors. This initial phase acknowledges the complexity of FE mathematics teaching while maintaining close connection to participants expressed experiences.

The second-level analysis focuses on pattern identification across cases, theoretical integration with existing literature, cross-case analysis for deeper insights, and contextual consideration of institutional factors. This dual-phase approach enables what Dennis (2016) terms 'practice-sensitive analysis', maintaining connection to the lived reality of FE teaching while facilitating theoretical insight. For example, when practitioners discuss adapting teaching approaches, the analysis considers both the immediate pedagogical implications and broader institutional contexts shaping such decisions. As evidenced in preliminary research, '*Maths teachers must look to appeal to the interests of maths learners. If this involves changing a scheme, altering a plan of delivery, contextualising or bringing the subject to life, then so be it.*' This demonstrates how the coding strategy will capture both practical teaching strategies and their situational determinants.

The analytical process remains iterative, moving between these levels to develop increasingly sophisticated interpretations while maintaining grounding in practitioners' experiences. This approach acknowledges what Bathmaker (2019) identifies as the complexity of FE mathematics teaching, where pedagogical decisions are shaped by multiple contextual factors including institutional constraints, learner diversity, and policy requirements. The coding strategy therefore enables analysis that is both theoretically robust and practically relevant to the FE mathematics teaching context. The application of this two-level coding strategy is demonstrated in Chapter 4,

where interview data is analysed to reveal patterns of collective meaning-making within and across professional communities.

3.5.3 Theme Development

Theme development follows what Noyes et al. (2017) term 'contextual validity assessment', involving systematic pattern recognition and theoretical integration within the FE mathematics teaching context. Initial theme identification encompasses comprehensive analysis across the complete quantity of data, integrating established theoretical frameworks with empirical findings while maintaining regular verification of internal coherence and theoretical quality. The researcher grouped responses to questions directly from the question domains, to identify initial codes before exploring any emerging themes. This systematic approach acknowledges the complex nature of mathematics teaching in Further Education while ensuring methodological rigour.

The theme refinement process focuses specifically on what Hodgson and Spours (2017) identify as key dimensions of FE practice. These dimensions include the effectiveness of pedagogical approaches, the formation and development of professional identity, the influence of institutional contexts, the impact of policy implementation, and factors affecting student engagement. This multidimensional framework enables thorough examination of the varied factors shaping mathematics teaching in FE settings. This thematic framework particularly considers what preliminary research identifies as crucial: '*Maths teachers must adapt practice to teach effectively, and learners must learn to learn*'. The development process will maintain what Coffield et al. (2014) term the 'practice-theory nexus' ensuring themes remain grounded in practitioner experience while facilitating theoretical insight. This approach acknowledges the dual requirement of maintaining practical relevance to FE mathematics teaching while contributing to theoretical understanding in the field.

3.5.4 Quality Measures

The quality assurance measures align with Crawley's (2016) established protocols for FE educational research, incorporating multiple verification strategies for credibility enhancement, transferability considerations, and confirmability. Credibility is strengthened through extended engagement with data ensuring analytical depth, multiple triangulation procedures across data sources, systematic member checking with participants, and comprehensive audit trail maintenance. Transferability is supported through rich description of context and participants, clear documentation of analytical decisions, variation sampling across institutional types, and

explicit boundary definition. Confirmability is achieved through regular reflexivity practices, systematic bias acknowledgement, clear positionality statement, and rigorous decision documentation.

The quality framework acknowledges certain methodological constraints, balanced against what Ball et al. (2012) identifies as the value of deep qualitative investigation in educational settings. The internal validity of this study focuses upon using low inference descriptors by means of the same set of questions delivered in the same method in the same setting. This comprehensive quality assurance framework reflects what Stake (2010) terms 'disciplined subjectivity' maintaining rigorous research standards while acknowledging the inherently interpretive nature of qualitative inquiry. This approach enables systematic investigation of mathematics teaching practices while recognising the complex variables present within this ambition, including diverse learner populations, varied prior learning experiences, and the challenge of delivering extensive curriculum content within limited timeframes.

3.6 Research Quality and Rigour

3.6.1 Trustworthiness Criteria

This study employs Lincoln and Guba's (1985) established framework for ensuring trustworthiness in qualitative research, specifically adapted for investigating the socially constructed professional practice. Within the complex landscape of FE mathematics education identified by Noyes et al. (2021), credibility was enhanced through prolonged engagement with participants and persistent observation during the semi-structured interview process. This approach enabled deep exploration of what Hodgson and Spours (2017) identify as key dimensions of FE practice, including pedagogical approaches, professional identity formation, and institutional influences.

Transferability was supported through rich description of both participant contexts and methodological decisions, acknowledging what Dalby and Noyes (2016) term the 'beleaguered' as a point in which to investigate the status of mathematics within FE settings. This contextual sensitivity enables readers to assess relevance to other FE settings while recognising what Biesta (2010) identifies as the tension between measurable outcomes and educational desirability. Dependability was strengthened through maintenance of a comprehensive audit trail documenting analytical decisions and theoretical developments, particularly important given what Smith and Golding (2019) identify as the diverse challenges in FE mathematics education. Confirmability was established through systematic triangulation procedures and explicit

acknowledgment of researcher positionality, crucial given what Pring (2015) identifies as the need for professional judgment in understanding educational complexities.

A few relevant perspectives include the researcher having formerly taught and managed maths programmes in FE, worked in teacher development programmes, and philosophically valuing practical and equity-minded approaches to education. Findings are presented with rich descriptions and excerpts from various participant voices to support interpretations. Providing thick descriptions allows readers to assess transferability or naturalistic generalisability to contexts and populations they deem potentially comparable. This comprehensive approach to trustworthiness reflects what Brinkmann and Kvale (2015) term the co-constructed nature of knowledge in qualitative research, while acknowledging the specific challenges of investigating mathematics teaching within what Bourdieu (1986) conceptualises as the complex field of FE education.

3.6.2 Credibility in Social Constructivist Research

Establishing credibility in social constructivist research requires different criteria than phenomenological or positivist approaches. Rather than seeking objective validity or individual authenticity, credibility depends on whether the research adequately captures collective meaning-making processes. Four criteria guided this assessment.

First, resonance with professional communities: member checking focused not on whether individual accounts were accurate but whether identified collective discourses and shared practices resonated with participants' experience of their professional communities. Participants were asked whether the patterns identified reflected discourse circulating within FE mathematics teaching contexts they recognised.

Second, evidence of circulation: analysis documented linguistic patterns, shared metaphors, and common narratives appearing across multiple participants from different institutions. When teachers independently used identical phrases such as 'rebuilding confidence,' 'meeting them where they are,' 'mathematical trauma', this indicated genuine circulation through professional discourse rather than isolated individual invention or researcher imposition.

Third, institutional context sensitivity: the research documented how collective meanings varied across institutional types while identifying broader sector-wide patterns. Analysis distinguished between meanings specific to particular college contexts and those circulating more widely across the FE mathematics sector.

Fourth, analytical transparency: comprehensive audit trails show analytical progression from individual statements to collective pattern identification. Documentation traces how interpretations of collective processes were developed from interview data, enabling readers to follow and evaluate the analytical reasoning employed.

3.6.3 Validation Strategies

Multiple validation strategies were employed to enhance methodological rigour, acknowledging what Braun and Clarke (2019) identify as the necessity for systematic yet reflexive approaches in educational research. These strategies were specifically selected to address what Hodgson and Spours (2017) identify as the multilayered nature of FE mathematics teaching practice, while maintaining sensitivity to what Coffield (2008) terms the complex interplay between policy, practice, and learner needs.

Analyst triangulation was implemented through peer review of coding and theme development, reflecting what Dalby and Noyes (2016) identify as crucial for understanding the peripheral positioning of mathematics within FE settings. This process aligned with what Lave and Wenger (1991) discuss as the 'legitimate peripheral participation', enabling validation through communities of practice. Systematic member checking of interview transcripts and emerging interpretations acknowledged what Duckworth and Maxwell (2015) identify as the importance of practitioner voice in understanding FE teaching experiences, particularly pertinent given what Biesta (2010) terms the tension between measurement and meaningful educational practice.

Rich description of context and participants, while maintaining anonymity, enabled what Smith and Golding (2019) identify as crucial contextual understanding of FE mathematics teaching challenges. This approach aligned with what Bronfenbrenner (1979) conceptualises as the ecological nature of educational experiences, acknowledging multiple systemic influences on teaching practice. Clear documentation of analytical decisions and theoretical connections reflected what Priestley et al. (2015) promote as the importance of teacher agency within structural constraints.

Regular research supervision and peer debriefing sessions provided what Engestrom (2001) identifies as opportunities for expansive learning through critical dialogue. These validation strategies collectively align with what Noyes et al. (2017) identify as crucial for maintaining contextual validity in FE research settings, while acknowledging what Swan (2006) terms the complex nature of mathematics teaching practices.

3.6.4 Limitations

Several methodological limitations warrant acknowledgment. The sample of ten participants, while appropriate for in-depth qualitative investigation, necessarily limits statistical generalisability. This research prioritises depth over breadth, understanding how professional meanings emerge through collective discourse requires sustained engagement with participants' accounts rather than surface-level data from larger samples.

Geographic concentration in Northeast England enabled deep contextual understanding of regional educational ecosystems but may not capture the full range of FE mathematics teaching experiences nationally. However, this regional focus proved valuable: the Northeast's diversity, from coastal colleges to post-industrial towns, from specialist providers to large FE colleges, provided sufficient institutional variation to identify both context-specific and sector-wide patterns in professional discourse.

The single-interview design enabled detailed exploration of how teachers draw upon collective professional knowledge when describing their practice. However, it cannot capture longitudinal developments in teaching practice or how professional meanings evolve over time within communities of practice. Follow-up interviews might have revealed whether collective discourses identified were stable or shifting in response to policy changes or institutional restructuring.

Additionally, the researcher's position as former FE mathematics teacher required careful reflexive attention to potential bias in data interpretation. While insider knowledge facilitated recognition of sector-specific discourse patterns, it risked over-reading participants' accounts through assumptions about shared meanings. The reflexive practices detailed in Section 3.6.5 addressed these challenges systematically (Brinkmann & Kvale, 2015; Coffield, 2008; Noyes et al., 2021; Priestley et al., 2015; Smith & O'Leary, 2015).

3.6.5 Quality Enhancement

Quality enhancement measures were embedded throughout the research process. The interview protocol was carefully developed through engagement with Holstein and Gubrium's (2016) active interviewing framework and refined through consultation with supervisory team members experienced in FE research. Early interviews revealed assumptions built into questions, for instance, initial questions about 'routes into teaching' presumed participants had followed initial traditional teacher training pathways. Several participants had entered FE mathematics teaching through industry careers or vocational expertise, challenging this framing. Recognising this

pattern prompted more open questioning: asking how teachers came to their current role rather than assuming teacher trai qualification routes.

Regular supervisory consultation provided external perspective, particularly valuable given insider positioning. Supervisory challenge consistently distinguished between what teachers explicitly stated and what might be inferred from sector knowledge. When analysing a transcript where a teacher described 'doing what we always do to engage with resit students,' initial interpretation assumed this meant familiar strategies like contextualised problems or real-world applications. Supervisory challenge prompted return to the data: what did this teacher specify about 'engagement'? The teacher had described relationship-building activities but hadn't quantified how much lesson time this consumed or detailed what 'we always do' meant in practice. This reflexive questioning prevented over-reading participants' accounts, recognising that vague phrases like 'engagement' might mean different things across different institutional contexts.

Emerging interpretations underwent peer review with doctoral colleagues, grounding the research in practitioner realities while maintaining analytical rigour (Coffield, 2008). Member checking invited participants to review whether identified collective patterns resonated with their professional community experience. Detailed reflexive notes were maintained throughout data collection and analysis, documenting analytical decisions and explicitly marking when interpretations drew on insider knowledge versus participant accounts. These notes tracked the influence of researcher habitus on interpretative processes (Bourdieu, 1986), particularly attending to how prior experience in FE mathematics contexts shaped reading of data. The combined implementation of these quality measures provides what Stake (2010) terms 'warranted assert-ability', enabling confidence in findings while acknowledging the inherently interpretive nature of qualitative inquiry (Braun & Clarke, 2019; Duckworth & Maxwell, 2015; Noyes et al., 2021)

3.7 Ethical Considerations

3.7.1 Ethical Framework

Ethical considerations were paramount throughout this investigation. The research received full approval from the University of Sunderland Ethics Committee and adhered to BERA (2024) guidelines and core ethical principles established by Hammersley and Traianou (2012). All participants provided voluntary informed consent after receiving detailed information about the study's purposes, activities, potential risks and benefits, and data protection protocols. They

retained the right to withdraw at any stage without consequence. Anonymity was protected through de-identification of all transcripts, with participants designated P1-P10 in all documentation and outputs.

Interview topics remained within the boundaries of issues teachers commonly discuss in professional contexts, avoiding potentially distressing content while enabling authentic exploration of teaching experiences. Participants maintained control over what personal information they shared, and the researcher prioritised transparency about how data would be used throughout the research process. Given the insider positioning discussed in Section 3.3, particular attention was paid to power dynamics. Some potential participants knew the researcher from sector networks or previous institutional connections; the voluntary nature of participation was explicitly emphasised to ensure professional relationships did not create perceived pressure to participate.

3.7.2 Informed Consent

The consent process followed Floyd and Arthur's (2012) enhanced consent protocols for insider research, recognising the multilayered nature of FE teaching practice (Hodgson & Spours, 2017). Participants received detailed written information about the study before interviews, allowing time for questions and reflection before providing written consent. The information sheet explicitly addressed the researcher's insider positioning and previous sector roles, emphasising that participation was entirely voluntary and would not affect any existing or future professional relationships.

Given the close-knit nature of FE mathematics teaching communities in the Northeast, particular attention was paid to anonymity. Participants were informed that all identifying information, including names, institutions, and specific geographical locations, would be removed from transcripts and replaced with generic descriptors (P1-P10, 'coastal college,' 'urban FE college'). Access to identifiable data was restricted to the researcher and research supervisor only. Participants retained the right to withdraw at any point until data analysis was complete and were informed about how to action withdrawal should they wish to do so. This process acknowledged the potential professional vulnerabilities within what Dalby and Noyes (2016) term the 'beleaguered' status of mathematics in FE, ensuring participants could speak candidly without concern for institutional or professional repercussions.

3.7.3 Data Protection

Data protection protocols adhered to GDPR requirements and sector-specific sensitivities in educational research (Lancaster, 2017). All interview recordings and transcripts were stored on encrypted, password-protected devices with access restricted to the researcher and research supervisor only. Participants were assigned codes (P1-P10) to anonymise all transcripts and research documentation, removing identifying information including names, institutions, and specific locations.

A systematic data management schedule governed the research process. Raw audio files were deleted following transcription verification, with anonymised transcripts retained for the required institutional governance period before secure destruction. These protocols recognised the close-knit nature of FE mathematics teaching communities in the Northeast, where institutional relationships and professional reputations required careful protection (Bourdieu, 1986; Lamas et al., 2015; Morrison et al., 2020)

3.7.4 Participant Welfare

Participant welfare considerations followed established protocols for practitioner research in FE settings (Crawley, 2016). All participants received comprehensive information about their rights before, during, and after interviews, including the right to withdraw at any stage without consequence and the right to withdraw their data post-interview in accordance with BERA (2024) guidelines. The researcher prioritised building trust through transparency about study purposes, data protection measures, and how findings would be used.

Given the dual role as insider-researcher, particular attention was paid to maintaining professional dignity and respecting participants' embedded positions within FE mathematics communities. Interviews were conducted at times and locations convenient to participants, acknowledging the intensive workload pressures characteristic of FE teaching. Participants received opportunities to review interview transcripts and emerging interpretations, ensuring their voices were accurately represented while maintaining the analytical rigor necessary for systematic inquiry (Ball et al., 2012; Braun & Clarke, 2019; Lave & Wenger, 1991).

3.8 Chapter Summary

This chapter established the methodological framework for investigating how FE mathematics teachers collectively construct professional identity and practice through institutional discourse. The research adopts social constructivist ontology and epistemology, recognising that professional knowledge doesn't reside in individual teacher cognition but circulates through

workplace interactions, corridor conversations, departmental meetings, professional networks, and sector-wide discussions about policy implementation.

The central methodological challenge was accessing collective meaning-making processes when practical constraints prevented direct observation of workplace interaction. Semi-structured interviews with ten FE mathematics teachers across Northeast institutions addressed this challenge by treating individual interviews as sites where collective professional discourse becomes visible. Analysis attended to shared language patterns, collective narratives, institutional discourse markers, and professional community references to distinguish collective from individual meanings.

The researcher's twenty-year history within FE mathematics created insider-outsider positioning requiring systematic reflexive practices: maintaining detailed analytical journals, regular supervisory consultation challenging assumptions, member checking focused on collective pattern recognition, and explicit marking of when interpretations drew on insider knowledge versus participant accounts. Data analysis employed reflexive thematic analysis adapted for identifying collective meaning-making, examining how teachers positioned themselves within professional communities through mutual engagement, joint enterprise, and shared repertoires.

Quality measures included comprehensive audit trails, analyst triangulation, member checking, and rich contextual description enabling assessment of transferability. Ethical considerations received full approval from the University of Sunderland Ethics Committee, with particular attention to power dynamics given insider positioning and the close-knit nature of regional FE mathematics communities.

The methodology maintains coherent alignment between theoretical framework (social constructivism), research focus (collective meaning-making), and analytical procedures (identifying shared discourse patterns). This approach enables investigation of how professional knowledge emerges through social processes rather than individual reflection, addressing the three research objectives examining collective professional identity formation, socially negotiated standards of excellence, and development of teaching expertise through community participation.

The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Chapter 4: Results Analysis

Chapter 4: Analysis of Findings

4.1 Introduction

This chapter examines how FE mathematics teachers collectively construct professional meanings through institutional discourse and community participation. Rather than residing in individual teacher cognition or formal training programmes, sophisticated professional understanding in FE develops through collective engagement with complex pedagogical challenges. This matters particularly for FE contexts because, as Chapter 2 established, formal continuous professional development is limited; teachers must collectively construct professional meaning to sustain effective practice despite structural constraints.

As Chapter 1 established, 200,000 learners annually retake GCSE mathematics in FE, achieving only 20% pass rates despite mandatory resit policies. Teachers must cover 50 mathematics topics in 30 weeks with learners who have experienced years of failure. The implementation gaps identified in Chapter 2, with 89% of colleges unable to recruit qualified teachers, minimal professional development provision, accountability frameworks measuring only Grade 4 achievement, create conditions where teachers cannot rely on external support structures. This analysis reveals how they collectively construct professional meanings that enable sustained pedagogical effectiveness despite these structural impossibilities. Understanding how teachers collectively construct professional meanings becomes essential for understanding how they sustain pedagogically sophisticated practice despite these structural constraints.

This socially constructed knowledge production reflects what Wenger (1998) terms 'negotiated meaning' within communities of practice but also demonstrates what Holstein and Gubrium (2008) identify as institutional discourse negotiation, the active process through which professionals construct professional identities and meanings even within constraining policy environments. These theoretical perspectives, grounded in the neoliberal policy context and definitions of professional success outlined in Chapter 2, form the foundation for this analysis. Chapter 3 established that professional knowledge in FE mathematics teaching emerges not through individual cognition or formal training, but through workplace conversations, collaborative problem-solving, and participation in professional communities. This analysis identifies patterns of collective meaning-making by examining how teachers draw upon shared professional discourse when describing their practice. The investigation addresses three research objectives established in Chapters 1 and 2:

RO1: Building Professional Identity Together - How teachers from diverse backgrounds, including engineers, accountants, and industry professionals, without common pedagogical

training develop shared understanding of 'what it means to be an FE mathematics teacher' through workplace conversations and community participation. Professional identity forms the foundation for collective meaning-making.

RO2: Creating Shared Standards of Excellence - How teachers collectively negotiate professional quality indicators that extend beyond external accountability metrics (Grade 4 achievement), constructing alternative definitions of success grounded in their professional identity and contextual understanding. Once identity is established, communities can define collective standards.

RO3: Developing Teaching Expertise Through Community - How distinctive pedagogical approaches emerge and circulate through professional networks rather than individual discovery or formal training. These approaches are adopted because they align with the professional identity and standards established through RO1 and RO2.

These three objectives are sequentially dependent emerged as shared professional identity (RO1) enables collective standard-setting (RO2), which in turn determines which pedagogical approaches gain legitimacy within communities of practice (RO3). The analysis reveals these are not isolated processes but mutually reinforcing dimensions of collective meaning-making that enable teachers to sustain effective practice despite structural constraints. Interview data from ten FE mathematics teachers across Northeast England was analysed using the communities of practice framework (Wenger, 1998) combined with institutional discourse analysis (Holstein & Gubrium, 2008). Rather than treating individual accounts as isolated perspectives, analysis attended to four key indicators of collective meaning-making: shared language patterns appearing across multiple participants, collective narratives with similar structures, institutional discourse markers referencing departmental or sector-wide practices, and professional community references indicating social learning processes.

Before presenting the findings, it is important to clarify what this analysis means by 'professional knowledge' and how this develops distinctly in FE mathematics teaching. Following the definitions established in Chapter 2, professional knowledge here encompasses not merely technical understanding of mathematics pedagogy, but also shared professional norms, negotiated definitions of 'success' in teaching, collective understandings of the teacher's role, and the pedagogical approaches that communities of practice have legitimated. The analysis specifically examines how such knowledge develops through social processes, what Wenger (1998) terms learning as participation, rather than as individual cognition acquired through formal training.

This chapter proceeds as follows: Section 4.2 establishes the analytical approach for distinguishing collective meaning-making from individual perspectives, explaining how the communities of practice framework and institutional discourse analysis were systematically applied. Section 4.3 presents findings organised by research objective, demonstrating how professional identity, quality standards, and pedagogical expertise emerge through social processes. Section 4.4 examines how these three dimensions interact, revealing the complex dynamics through which collective meanings are constructed and sustained. Section 4.5 situates these findings within existing theoretical frameworks, identifying three specific extensions to communities of practice theory. Section 4.6 synthesises the contribution to understanding professional knowledge construction in constrained educational contexts

4.2 - Analytical Approach - Distinguishing Collective from Individual Meanings

Chapter 3 (Section 3.2.3) established that interviews would be treated not as windows into individual teacher cognition but as occasions where participants make visible the collective discourse shaping their professional communities. This section explains how analysis distinguished collective meaning-making from individual perspectives. This analysis identified collective meanings through four systematic indicators, each revealing different aspects of how professional discourse circulates through communities:

- **Shared Language Patterns** - Identical or near-identical phrases appearing across multiple participants from different institutions, indicating circulation through professional discourse rather than individual invention
- **Collective Narratives** - Recurring narrative structures with similar themes, characters, and resolutions across interviews, suggesting shared interpretive frameworks within professional communities
- **Institutional Discourse Markers** - References to departmental decision-making, institutional policies, or sector-wide practices, indicating knowledge constructed through institutional participation
- **Professional Community References** - Explicit mentions of learning from peers, professional networks, or collaborative problem-solving, demonstrating participation in communities of practice.

4.2.1 Four Indicators of Collective Discourse

Following the methodological framework established in Chapter 3, this analysis identified collective meanings through a systematic approach grounded in four key indicators. These

indicators draw on discourse analysis theory (Holstein & Gubrium, 2008) combined with narrative analysis and are outlined below to demonstrate how interview data was examined for evidence of collective rather than individual meaning-making.

The four indicators described below represent a deductive analytical approach where predetermined theoretical markers, derived from the communities of practice framework and discourse analysis theory, were systematically applied to interview data. This differs from inductive coding, where categories emerge from the data itself. The indicators function as a theoretically-informed lens through which to read the data, guiding the identification of instances that exemplify collective meaning-making. Once instances matching these indicators were identified, they were then examined through more detailed thematic coding to extract specific meanings, language patterns, and narrative structures. This two-stage analytical process, first applying indicators to identify relevant data segments, then coding those segments for detailed patterns, follows the methodological approach outlined in Holstein and Gubrium (2008) for institutional discourse analysis and has been systematically applied across all interview transcripts.

Shared Language Patterns (Indicator 1)

When multiple teachers independently used identical or near-identical phrases, this suggested circulation through professional discourse rather than individual invention. For example, eight of ten participants used the phrase 'rebuilding confidence' when describing their role, indicating a shared professional narrative about FE mathematics teaching that transcends individual institutions. This indicator draws on discourse analysis theory which posits that shared language reflects shared meaning-making within communities (Holstein & Gubrium, 2008; Wenger, 1998).

To identify instances of shared language patterns, transcripts were examined through deductive coding, searching for phrases appearing in three or more interviews across different institutional contexts. A phrase was considered indicative of collective discourse when (1) participants came from different institutions, (2) no participant attributed it to an external source, and (3) it captured a shared understanding of practice.

Collective Narratives (Indicator 2)

When teachers told structurally similar stories despite different personal circumstances, this revealed shared sense-making within professional communities. For instance, multiple participants described unplanned entry into FE mathematics teaching followed by

transformative mentoring relationships, a narrative pattern suggesting shared professional discourse about legitimate pathways into the field.

To identify collective narratives, this analysis employed narrative analysis methods. Common story structures were examined across interviews and when three or more participants described similar experiences using comparable narrative arcs, these patterns were analysed as collective rather than coincidental. This approach recognises that shared narrative structures indicate circulation through professional sense-making, aligning with how Holstein and Gubrium (2008) examine institutional discourse through storytelling and shared meaning-making.

Institutional Discourse Markers (Indicator 3)

Phrases explicitly referencing collective processes—'we found that…,' 'the department decided…,' 'our approach is…'—made visible the institutional conversations through which professional meanings emerge. These linguistic markers directly indicated participation in collective sense-making.

To identify institutional discourse markers, transcripts were systematically coded for first person plural pronouns ('we,' 'our') and collective nouns ('the team,' 'the department'). When instances appeared, they were examined for what they revealed about workplace discourse and collaborative decision-making. This approach aligns with Holstein and Gubrium's (2008) analysis of institutional discourse, recognising that language choices indicate participation in collective professional processes.

Professional Community References (Indicator 4)

When teachers described learning approaches from colleagues, adapting departmental resources, or participating in sector-wide initiatives, they made visible the social processes through which expertise develops. These references demonstrated that professional knowledge circulates through networks rather than emerging individually.

Following the establishment of these four indicators, the coding process proceeded through a systematic sequence. All ten transcripts underwent an initial review to identify instances matching the indicators. To ensure that conclusions reflected collective patterns rather than isolated occurrences, meaningfulness thresholds were applied as instances were considered significant when they appeared across a minimum of three participants from different institutions (for Indicators 1 and 4) or demonstrated strong patterning within the broader data set (for Indicators 2 and 3). Instances meeting these criteria then underwent detailed coding, with attention paid to specific meanings, language variations, and thematic content. All coded

instances were organised according to their alignment with the research objectives, allowing analysis to highlight which contributed to understanding of RO1, RO2, or RO3. This systematic approach ensured that conclusions about collective meaning-making were grounded in multiple confirming instances rather than derived from isolated individual accounts, thereby strengthening the validity and generalisability of the findings.

These four indicators work in combination rather than isolation. The most compelling evidence of collective meaning-making emerges when multiple indicators converge. For example, when 'rebuilding confidence' appears as shared language (Indicator 1), within structurally similar narratives about role transition (Indicator 2), referenced using institutional discourse markers like 'what we do' (Indicator 3), and explicitly attributed to mentoring relationships (Indicator 4), this convergence provides robust evidence of circulation through professional communities. Analysis therefore attended not only to individual indicators but to patterns of convergence strengthening claims about collective rather than individual meaning-making. Instances where only one or two indicators appeared were treated more cautiously, acknowledged as potentially collective but requiring additional supporting evidence.

This approach ensures that theoretical claims about 'collective meaning-making' are grounded in patterns across participants and contexts, not in isolated examples, thereby strengthening the empirical warrant for conclusions. Coding identified references to peer observations, collaborative planning, resource sharing, mentoring relationships, regional networks, and sector-wide initiatives (e.g., CfEM, Maths Hubs). These instances were analysed for what they revealed about communities of practice.

4.2.2 Theoretical Foundation: Communities of Practice and Institutional Discourse Analysis

While Wenger's (1998) communities of practice framework provides the primary lens for understanding how professional knowledge circulates through social participation, this analysis also draws on institutional discourse analysis (Holstein & Gubrium, 2008) to examine the specific linguistic and narrative processes through which professional meanings are constructed and negotiated within institutions. Where communities of practice theory explains *why* professionals develop shared meanings through participation, institutional discourse analysis illuminates *how* this process occurs through language use, narrative patterns, and institutional interactions. The integration of these two theoretical approaches provides a more complete understanding of professional knowledge development in FE mathematics contexts, particularly where institutional constraints shape which meanings can be constructed and sustained.

Analysis examined how interview data reflected the three dimensions of communities of practice (Wenger, 1998):

Mutual Engagement emerged as evidence that teachers regularly interact in ways that develop relationships and establish working norms. This included references to team meetings, collaborative planning sessions, informal corridor conversations, and peer observations.

Joint Enterprise emerged as evidence that teachers collectively negotiate understanding of their community's purpose, potentially differing from externally imposed mandates. This included shared definitions of 'success,' collectively constructed priorities, and negotiated responses to institutional demands.

Shared Repertoire emerged as evidence of communal resources including teaching strategies, adapted materials, common approaches, and professional language developed through collective experience rather than formal training.

Applying this framework to FE mathematics teaching required sensitivity to institutional context. Mutual engagement may be constrained by timetabling, resource limitations, or geographical isolation. Joint enterprise may be contested when institutional demands conflict with professional judgments. Shared repertoires may develop informally when formal professional development is inadequate. The analysis therefore examined not only whether these dimensions were present, but how they operated within the specific constraints of FE mathematics contexts, where communities of practice must often function despite rather than because of institutional support structures.

4.2.3 Epistemological Grounding: Interpretivist Approach to Collective Meaning-Making

This analysis adopts an interpretivist-constructivist epistemology that shapes both the methodology and the interpretation of findings. Rather than treating limitations as weaknesses, this approach recognises how qualitative inquiry through semi-structured interviews provides rich access to meaning-making while acknowledging the interpretive nature of the process.

Interview data does not directly capture workplace conversations in their natural contexts but instead provides participants' reconstructed accounts of professional practice. This is not a limitation of the method but rather its intentional design. As Braun and Clarke (2019) argue, qualitative interviews provide valuable access to how people construct meaning about their experiences, which is precisely what this analysis seeks to understand - how teachers collectively construct professional meanings.

The analysis acknowledges that some patterns appearing collective might reflect common institutional constraints producing convergent responses. However, the four indicators, particularly when convergent across multiple indicators, provide robust evidence distinguishing genuine circulation through professional discourse from coincidental similarity. The methodological approach therefore uses careful triangulation across indicators, institutional contexts, and participant backgrounds to distinguish collective from individual meanings where evidence permits, following principles established in Holstein and Gubrium (2008).

4.3 Findings: Collective Construction of Professional Meanings

4.3.1 - RO1 Analysis - Building Professional Identity Together

This section examines how FE mathematics teachers from diverse backgrounds develop shared professional identities through institutional discourse and community participation. The analysis reveals three interconnected processes through which collective identity emerges: negotiating 'accidental' entry narratives, constructing shared definitions of the teacher role, and developing professional legitimacy through mentoring relationships.

Finding 1.1: The 'Accidental Teacher' Narrative - A Collective Story

A striking pattern emerged across eight of ten participants as they described entry into FE mathematics teaching as unplanned, circumstantial, or accidental. This shared narrative structure appeared consistently despite different personal circumstances:

Evidence of shared language: Eight of ten participants described entry as unplanned. Participant 1 noted: *'And I used to facilitate training and as I was facilitating, someone said you should be doing teaching. And I thought I couldn't think of anything worse. Being a teacher. Awful.*' Participant 2 explained: *'At that point, I had absolutely no intention whatsoever being a teacher. And they literally said to me: Can you teach these units? Because they're specialist units that fell out of normal chemistry and biology, and I don't know why, but I just went, 'Yeah, yeah, sure*.' Participant 5 stated: *'It was really by mistake. I've been working in schools for about 15 years... I never ever saw college jobs advertised, so I applied for a job head of maths at (Hidden College name), which I didn't get, but they offered me a lecturer... it was really by accident getting into colleges*.' The consistent pattern across participants, with none describing intentional career planning toward FE teaching, indicates the narrative structure circulates through professional discourse.

This is not merely coincidental similarity. The consistency of the 'accidental entry' narrative across multiple institutions, career stages, and personal backgrounds indicates circulation through professional discourse rather than individual experience.

No participant attributed this narrative to external sources (such as "I've been told this is common"), suggesting it represents genuinely shared professional sense-making within FE mathematics teaching communities. This indicates that specific understandings about entry into mathematics teaching have become naturalised—taken-for-granted within the profession. Evidence of this naturalisation emerges in how participants presented the narrative without requiring justification. Participant 3, for instance, simply stated: '*Yeah, fell into it completely by accident*.'

These naturalised understandings encompass three key beliefs that diverse entry routes are legitimate pathways into mathematics teaching; that accidental entry is a normal rather than an abnormal experience and that the mathematics teacher identity can be embraced without having initially sought it. Significantly, these taken-for-granted understandings enable teachers to practice with professional confidence despite lacking the formal credentialing systems available in school teaching. They represent a meaningful negotiation of the neoliberal policy context discussed in Chapter 2, which typically frames diverse backgrounds as deficits requiring remediation through additional training.

The 'accidental teacher' narrative serves specific functions within collective professional identity formation. First, it distinguishes FE mathematics teachers from school teachers who typically follow intentional, linear career paths through teacher training. This distinction creates collective identity by defining what FE mathematics teachers are not, products of formal training systems. Second, the narrative positions diverse backgrounds (engineering, accountancy, industry) as legitimate rather than deficient preparation, resolving potential identity tensions for teachers without traditional qualifications. This finding addresses Gap 1 identified in Chapter 2 (Section 2.5.2) - how teachers from varied backgrounds develop shared understanding of 'what it means to be an FE mathematics teacher.' The 'accidental entry' narrative represents collective sense-making that creates coherent professional identity from diverse experiences.

The consistency of this narrative across participants raises important questions about its origins and functions. Unlike school teaching, where formal training creates shared professional socialisation, FE mathematics teachers lack common preparation experiences. The 'accidental teacher' narrative may serve as a compensatory mechanism, a shared story that creates coherence where formal structures fail to provide it. This suggests that professional communities

facing similar conditions (diverse entry routes, absent formal training, institutional marginalisation) may similarly rely on narrative construction to build collective identity. The narrative's power lies not in its accuracy (some participants did intentionally pursue FE teaching) but in its capacity to create shared understanding from diverse experiences.

This finding exemplifies what Wenger (1998) identifies as the process through which communities of practice develop identity, shared narratives that create belonging despite diverse backgrounds. However, the 'accidental teacher' narrative has particular significance in FE contexts because it performs specific identity work in response to the policy constraints outlined in Chapter 2.

The narrative allows teachers to construct professional legitimacy without relying on formal qualifications, which aligns with what Evetts (2009) terms 'organisational professionalism', professionalism defined by institutional contexts rather than professional bodies. In FE, where teachers enter from diverse backgrounds and lack common initial training (Chapter 2), the 'accidental entry' narrative becomes a resource for constructing collective identity precisely because formal professional socialisation is absent.

By positioning diverse entry routes as natural rather than deficient, the narrative implicitly resists what Ball (2003) identifies as the neoliberal positioning of non-traditional backgrounds as 'problem' to be solved through retraining. Teachers collectively construct their diversity as legitimate precisely through this shared story, demonstrating what Apple (2004) terms 'collective resistance', not overt political action, but the construction of alternative professional meanings within constraining policy contexts. This finding addresses Gap 1 identified in Chapter 2 by showing how teachers from diverse backgrounds create shared professional identity through shared narratives that have become naturalised within FE mathematics communities, enabling them to practice effectively despite institutional marginalisation.

Finding 1.2: Collective Redefinition of the Teacher Role

Analysis revealed shared language patterns indicating collective negotiation of what FE mathematics teaching involves, particularly regarding the balance between mathematical instruction and affective work.

Seven participants independently used variants of the phrase 'rebuilding confidence' when describing their core role, providing evidence of shared discourse. Participant 1 noted' *A lot of what we do initially is selling maths to them, not teaching, we have to overcome the years of damage from their previous schooling*'. Participant 4 explicitly *stated' I think additionally getting the really reluctant students on board, getting them to engage and do something because we get*

a lot of students who are really quite frightened of maths and are reluctant to even try. So, when they first meet students' kind of building their confidence enough to at least just have a go at something.' Participant 8 emphasised' *I think creating that rapport with all the students, one-to-one, I think that's used as my teacher style.*' The recurring language of 'rebuilding,' 'confidence,' and 'affective' appears across different institutional contexts without attribution to training or curriculum frameworks, indicating circulation through professional discourse.

The consistency of this language, ‘rebuilding’, ‘confidence’, ‘affective’, appearing across different institutional contexts without explicit attribution to professional development or training materials indicates circulation through professional discourse. Notably, participants did not say ‘as we were taught in training’ or ‘according to the curriculum framework.’ Instead, they presented confidence-building as self-evident professional knowledge, suggesting it has become naturalised within FE mathematics teaching communities.

Institutional discourse markers emerged as multiple participants used collective language when describing this prioritisation. Participant 1 (Department Lead, 8 years in FE): 'A lot of what we do initially is selling maths to them, not teaching, we have to overcome the years of damage from their previous schooling' - Participant 5: 'Before they can even think about the actual maths' (implying shared understanding) - Participant 4: 'Where we're at with students' (collective positioning). These first-person plural pronouns ('we,' 'our') and collective nouns ('the team', 'the department') make visible the institutional conversations through which this role definition has been negotiated. Teachers reference departmental approaches without needing to explain or justify them, indicating not only shared understanding but also shared endorsement within their professional communities. This is an important distinction: meanings may be widely known without being valued, but when teachers present the 'confidence-building first' approach as taken-for-granted professional knowledge ('what we do'), this indicates they have collectively embraced this as a legitimate and valuable approach to FE mathematics teaching, one that has gained professional legitimacy through repeated affirmation within departments.

Analysis through communities of practice framework emerged as this finding exemplifies Wenger's (1998) concept of 'joint enterprise', the collectively negotiated understanding of a community's purpose. FE mathematics teachers have constructed shared understanding that their primary role involves affective work (rebuilding confidence, addressing anxiety, creating psychological safety) before mathematical instruction can occur. This joint enterprise differs from both external policy mandates that measure success primarily through Grade 4 achievement and traditional mathematics teaching frameworks that prioritise content delivery.

The collective redefinition represents what Holstein and Gubrium (2008) term ‘institutional discourse negotiation’, teachers working within policy constraints while constructing alternative professional meanings that better capture their work's complexity.

This collective redefinition of the teacher role as 'confidence-building first' represents more than pedagogical preference, it constitutes what Holstein and Gubrium (2008) term 'institutional discourse negotiation' with political dimensions. By collectively prioritising affective work over content delivery, teachers implicitly resist policy frameworks measuring success solely through Grade 4 achievement. This is not individual rebellion but collectively constructed professional stance that has achieved sufficient legitimacy within FE mathematics communities to be articulated without justification. The naturalisation of this alternative role definition ('meet them where they are') indicates successful negotiation of professional autonomy within constraining accountability structures.

Finding 1.3: Mentoring as Legitimate Professional Development

Eight participants referenced mentoring relationships as pivotal to professional development, using remarkably similar language to describe this process despite different institutional contexts.

Participants told structurally similar stories beginning with initial uncertainty about their teaching effectiveness, moving through mentoring relationships where experienced colleagues modelled practice and provided feedback, and resulting in gradual development of increasingly effective practice, despite different institutional contexts.

For example, Participant 1 described initial uncertainty *'I thought I couldn't think of anything worse. Being a teacher. Awful*,' progressing to mentoring through critical mentor who built skills and confidence. Team teaching enabled observation and mimicking of effective practices,' resulting in graduated development *'I started to watch him and mimic everything that he did. And it's like my best right now is like huge mentor. Absolutely. Class teacher. Brilliant maths teacher and it just clicks.'*

Participant 8 similarly described the arc '*Think if I went in straight, if I didn't do the mentoring. And I went straight in your job. I think I would struggle with it. 100% I would struggle with it'* → 'mentoring was good, massively helped, especially the academic mentor role, and I could go see what you need to feature in maths classes, could take of what worked and what didn't work from my mentor' → *'I think it opened my eyes a bit, to see a bit of like what the learners are learning… I've used it myself.*' Participant 1 also noted' Critical mentor who built skills and confidence. Team

teaching enabled observation and mimicking of effective practices.' Participant 7 found *'greatest satisfaction teaching students directly—seeing learners develop mathematical thinking and understanding'* (developed through working alongside experienced colleagues). Participant 9 spoke of' *Observing and learning from other teachers' lessons.*'

The consistency of mentoring references across participants indicates shared professional discourse about legitimate learning pathways. Significantly, six participants contrasted mentoring and workplace collaboration positively with formal professional development. Participant 6, for instance, attended a *'course for maths'* described as *'repetitive, not highly impactful training for maths teachers*,' but valued collaborative planning in their department, *'I think that that kind of collaboration and that shared ownership is really important.'* Similarly, Participant 2 described a qualification as '*transformative*' specifically because it enabled *'collaborative planning'* rather than content delivery. These contrasts reveal collective meaning-making where FE mathematics teachers have constructed shared understanding that professional expertise develops primarily through workplace participation (mentoring, collaboration, peer observation) rather than formal training. This constitutes a 'shared repertoire' (Wenger, 1998) of professional learning approaches circulating through communities of practice, where formal training is valued only insofar as it enables social participation.

Connection to Gap 1 emerged as Chapter 2 (Section 2.5.2) identified the critical gap: 'How do teachers from vocational subjects such engineering, accountancy, and service industries, with limited common pedagogical training, develop shared understanding of what 'good FE mathematics teaching' means?' This finding provides empirical evidence that shared understanding develops through mentoring relationships that transmit collective professional discourse. When experienced teachers mentor newcomers, they socialise them into existing professional narratives ('accidental entry,' 'confidence-building first') and shared repertoires of practice.

This finding reveals not that formal learning is valueless, but rather a specific hierarchy of impact. Participants valued qualifications and training primarily when they enabled social participation, particularly collaborative planning and peer learning. This distinction is important - formal qualifications matter, but their impact depends on how they structure social engagement rather than content delivery alone.

As shown in the evidence above, Participant 6 described generic 'training for maths teachers' as 'repetitive, not highly impactful,' yet valued collaborative planning. Similarly, Participant 2 found a qualification 'transformative' specifically because it facilitated working alongside colleagues.

These accounts suggest that professional development through formal channels is most effective when it creates conditions for workplace participation and collaboration.

This finding aligns with what Wenger (1998) describes as the relationship between 'communities of practice' and 'designed learning', it represents shared professional sense-making that has become naturalised within FE mathematics teaching communities. Formal education can support community participation, but learning itself emerges through practice within communities. In FE contexts where, as Chapter 2 established, formal professional development is limited and resource-constrained, teachers have adapted by creating informal learning communities through mentoring, peer observation, and collaborative planning. These social structures have become the primary sites of professional learning not because formal training is valueless, but because the specific conditions of FE have made workplace participation more accessible and impactful than external training provision.

This finding directly addresses the critical research objective identified in Chapter 1 and examined in the literature review (Chapter 2, Section 2.5.2): How do FE mathematics teachers from diverse professional backgrounds such as engineers, accountants, industry professionals etc. develop shared understanding of what constitutes 'good FE mathematics teaching' when they lack common pedagogical training? The evidence reveals that mentoring relationships serve as the primary socialisation mechanism through which experienced teachers transmit collective professional discourse, narratives, and values to newcomers. Rather than formal training, workplace participation in mentoring relationships enables teachers to internalise and reproduce the shared meanings their professional communities have collectively constructed.

Summary of RO1 Findings:

Collective professional identity in FE mathematics teaching emerges through three interconnected processes. First, shared narrative construction enables the 'accidental teacher' story to create coherent identity from diverse backgrounds. Second, joint enterprise negotiation occurs through collective redefinition of the role, prioritising affective work through institutional discourse. Third, mentoring serves as a socialisation mechanism through which experienced teachers transmit collective professional discourse to newcomers.

These findings demonstrate that professional identity is not individually constructed but emerges through participation in communities of practice where shared meanings circulate through workplace conversations, mentoring relationships, and institutional discourse. This addresses Gap 1 by showing how diverse-background teachers develop shared professional understanding,

through social processes of narrative construction, discourse negotiation, and community participation rather than formal training or individual reflection.

4.3.2 Creating Shared Standards of Excellence (RO2)

This section examines how FE mathematics teachers collectively negotiate professional quality indicators that extend beyond external accountability metrics. Analysis reveals two primary processes: collective construction of alternative success measures and institutional discourse negotiation balancing external demands with professional judgment.

Finding 2.1: 'Lightbulb Moments' - Collective Alternative to Grade 4 Achievement

A shared professional discourse emerged regarding what constitutes 'real' success in FE mathematics teaching, focusing on student transformation rather than examination outcomes. While participants used varied language, their accounts converge around moments where students achieve sudden understanding what might be analytically termed 'lightbulb moments.' For example, Participant 4 described*: 'I think I get a little bit of a buzz out of when students kind of do get to understand something... 'Oh well actually I can do that though*

The construction of alternative success measures represents perhaps the most politically significant finding in this study. When teachers collectively define 'lightbulb moments' as equally or more important than Grade 4 achievement, they engage in what might be termed 'epistemological resistance', challenging not just policy metrics but the underlying assumptions about what counts as educational success. This finding must be understood not as individual teacher preference but as collectively negotiated professional stance that has achieved sufficient legitimacy within FE mathematics communities to be articulated openly and without defensive justification.

Evidence of shared language and collective narratives emerged as six participants independently used the metaphor of 'lightbulb moments' to describe meaningful success. Participant 4: 'Where the student's gone, 'Oh! Now I get it!'...That's the joy you get from it. It's not the certificates, it's that'. Participant 7: 'Found greatest satisfaction teaching students directly - Seeing learners develop mathematical thinking and understanding'. Participant 10: 'That moment when they suddenly understand - that's what matters.'

The consistency of language around 'lightbulb moment' and *'suddenly understand'* indicates circulation through professional discourse. Significantly, multiple participants explicitly contrasted these moments of student understanding with formal success metrics. Participant 4 directly rejected credentialing *'It's not the certificates; it's that When they start to understand and*

then get a qualification... It's nice to see the students progressing with that and building their confidence. That's what I remember. That's what makes teaching worthwhile.' Participant 4 further emphasised this distinction when discussing how they frame professional values to trainee teachers, *'I always when I meet teachers in training say, if you've got a learner in front of you who just turned round and said, "I hate maths," what's your answer? I must have about several hundred responses to that now'*, positioning lived understanding over measurable outcomes as the marker of professional success.

This explicit rejection of credentials in favour of understanding moments reveals how FE mathematics teachers collectively construct success measures that diverge from policy metrics. Multiple participants described satisfaction from student breakthroughs despite examination failures, indicating shared professional hierarchy where transformative learning moments are valued above formal achievement. This represents collective meaning-making about what constitutes meaningful teaching practice, distinguishing their professional identity from institutional accountability frameworks.

This finding addresses the critical gap identified in Chapter 2 (Section 2.5.3): *How do teachers collectively negotiate meanings of professional excellence within policy constraints, constructing alternative quality indicators through workplace conversations that extend beyond externally imposed accountability metrics?* The evidence reveals that teachers do not simply comply with or resist Grade 4 achievement measures; instead, they engage in active institutional discourse negotiation. They simultaneously acknowledge external demands ('Grade 4 achievement is institutionally required') while constructing and legitimising alternatives ('lightbulb moments' and confidence transformation matter equally). This negotiation achieves sufficient professional legitimacy that teachers articulate these alternative standards without defensive justification, indicating genuine collective endorsement rather than isolated preference.

Institutional discourse markers revealing collective negotiation emerged as participants used collective language when describing alternative success measures: Participant 5: 'What we focus on' (departmental priority). Participant 1: 'Our approach' (shared methodology). Participant 4: 'Where we're at with students' (collective positioning). These markers indicate institutional conversations through which alternative success measures have been collectively legitimised. Teachers don't present 'lightbulb moments' as personal preferences but as shared professional standards, what Holstein and Gubrium (2008) term 'institutional discourse negotiation'.

Analysis through institutional discourse framework emerged as this finding exemplifies how professional communities negotiate meanings within constraining accountability frameworks. Teachers simultaneously:

1. Acknowledge external demands: All participants recognised Grade 4 achievement as institutionally required
2. Construct alternatives: Collectively defined 'lightbulb moments,' confidence transformation, and engagement as equally valid success measures.
3. Legitimise alternatives through collective discourse: Used 'we' language to position alternatives as professionally sanctioned.

This negotiation process enables what Chapter 2 (Section 2.3.4) identified teachers maintaining 'pedagogical commitment under conditions where institutional metrics systematically misrepresent their work.'

Finding 2.2: Collective Critique of 'Teaching to the Test'

Analysis revealed shared professional discourse critiquing examination-focused practice, indicating collective negotiation of what constitutes appropriate professional conduct.

Evidence of shared critique language emerged as seven participants used remarkably similar phrases to critique exam-focused approaches: Participant 7: 'tension between exam preparation and deeper learning'. Participant 8: 'teaching to the test...not just about rote procedures.' Participant 9: 'It becomes this very artificial thing...just teaching them to jump through hoops.' The consistency of this critique, 'teaching to the test, tension, creating 'artificial' conditions, suggests circulation through professional discourse rather than individual opinion. No participant attributed this critique to specific sources (research, training), indicating it has become naturalised professional common sense within FE mathematics communities.

Critique of exam-focused pedagogies reveals shared professional understanding across FE mathematics practitioners. Participant 7, a senior teacher with twelve years of FE experience, articulated the core tension '*tension between exam preparation and deeper learning*.' Participant 8, holding curriculum leadership responsibilities, described the consequence *'teaching to the test...not just about rote procedures*.' Participant 9, as Head of Department, characterised the broader pedagogical distortion '*It becomes this very artificial thing...just teaching them to jump through hoops*.'

Remarkably, seven of ten participants independently deployed identical evaluative language, *'teaching to the test*,' *'tension,*' '*artificial*', when critiquing exam-focused approaches. This consistency across different participant roles, experience levels, and institutional contexts suggests circulation

through professional discourse rather than individual pedagogical opinion. Significantly, no participant attributed this critique to external sources such as research literature or training materials, indicating that opposition to exam-instrumentalism has become naturalised professional common sense within FE mathematics communities. This shared critique represents collective professional meaning-making about legitimate pedagogy, where teachers across different institutional contexts have constructed common ground around the conviction that deep mathematical learning requires resistance to examination pressures. The uniformity of their evaluative language indicates this critique has become foundational to FE mathematics professional identity, distinguishing their pedagogical values from narrower accountability-driven framings of teaching effectiveness.

Collective narrative structure emerged as eight participants told structurally similar stories: external pressure to focus on examination → professional resistance → attempts to balance exam preparation with meaningful learning. This narrative consistency indicates shared sense-making about appropriate professional conduct.

Connection to Gap 2 emerged as Chapter 2 (Section 2.5.3) identified the critical gap: 'How do teachers collectively negotiate meanings of professional excellence within policy constraints?' This finding provides evidence: through shared discourse that simultaneously acknowledges institutional demands while constructing and legitimising alternatives. The 'teaching to the test' critique represents collective professional judgment that has achieved sufficient legitimacy within FE mathematics communities to be referenced without justification.

Finding 2.3: Institutional Marginalisation as Collective Experience

A striking pattern emerged as nine of ten participants described mathematics as institutionally marginalised using nearly identical language, suggesting shared professional narrative rather than isolated experience.

Evidence of shared language emerged as Participant 4: 'lip service paid…still not fully integrated', 'lower priority scheduling'. Participant 6: 'Everything else takes priority…it's seen as an add-on, a secondary thing' Participant 5: 'bolt-on…afterthought compared to learners' core vocational programmes.' The metaphors like 'bolt-on', 'add-on', 'afterthought' 'lip service', appeared across different institutions, suggesting circulation through professional discourse. This shared language creates collective understanding of FE mathematics teachers' organisational positioning.

Mathematics' institutional status emerges as consistently marginalised across FE contexts, regardless of institutional type or participant role. Participant 4, an experienced teacher, described how *'lip service paid to mathematics…still not fully integrated, lower priority*

scheduling.' Participant 6, holding departmental leadership responsibilities, similarly explained *'Everything else takes priority...it's seen as an add-on, a secondary thing.'* Participant 5 characterised the positioning more *sharply 'bolt-on...afterthought compared to learners' core vocational programmes.'*

Significantly, nine of ten participants independently deployed identical metaphorical language such as *'bolt-on', 'add-on'*, *'afterthought*', *'lip service'*, when describing mathematics' institutional status. This consistency across different institutional contexts and professional roles reveals shared professional understanding of systemic marginalisation rather than isolated institutional grievances. The uniformity of language suggests that marginalisation functions as structural feature of FE institutions, collectively recognised and collectively experienced by mathematics practitioners. This shared understanding of mathematics' subordinate position within institutional hierarchies represents common ground among teachers who otherwise work in different contexts and roles, indicating that systemic marginalisation shapes the professional identity formation across FE mathematics communities. Teachers collectively construct meaning around this structural constraint, where recognition of shared disadvantage becomes itself a binding element of professional community.

Institutional discourse markers emerged as participants referenced this marginalisation using collective language. Participant 6: *'They might give lip service...but it's not really translating into proper communication and actually fighting our corner'* (emphasis added). Multiple participants used '*we*' when describing marginalisation experiences. These markers indicate institutional conversations about organisational positioning, revealing how teachers collectively make sense of resource constraints and de-prioritisation.

Analysis of collective meaning-making function emerged as this shared narrative serves important purposes within professional communities:

1. Validates individual experiences: When teachers encounter resource constraints, shared discourse confirms this reflects systemic issues rather than personal failure.
2. Creates collective identity: Shared marginalisation narrative distinguishes FE mathematics teachers from more privileged subject areas.
3. Justifies alternative practices: Collective understanding of constraint provides legitimacy for adaptations and innovations.

This demonstrates what Holstein and Gubrium (2008) term institutional discourse enabling agency within constraint, teachers use shared narratives about marginalisation to collectively justify pedagogical decisions that might otherwise appear non-compliant.

Summary of RO2 Findings:

Collective negotiation of professional standards emerges through three interconnected processes. Construction of alternative success measures involves lightbulb moments and confidence transformation becoming collectively legitimised through shared discourse. Critique of examination focus occurs as shared professional discourse positions 'teaching to the test' as inappropriate, enabling collective resistance to reductive accountability. Shared marginalisation narratives create collective understanding of institutional positioning that validates experiences and justifies adaptations. These findings address Gap 2 by showing how teachers collectively negotiate alternative meanings of professional excellence through shared discourse that circulates within and across institutions, achieving sufficient legitimacy to be referenced without justification. Professional standards emerge not from individual belief but from collective negotiation within communities of practice operating under institutional constraints.

4.3.3 Developing Teaching Expertise Through Community (RO3)

This section examines how distinctive pedagogical approaches emerge and circulate through professional communities rather than individual discovery. Analysis reveals three processes: development of shared pedagogical repertoires, circulation of teaching strategies through professional networks, and collaborative problem-solving enabling sophisticated practice.

Finding 3.1: 'Meet Them Where They Are'- A Shared Pedagogical Repertoire

A distinctive phrase appeared across seven of ten participants when describing their teaching approach of 'meet them where they are' or close variants. This shared language indicates circulation of pedagogical knowledge through professional communities.

Evidence of shared pedagogical discourse emerged as Participant 1: 'Affective factors first, not content. Meet them where they are'. Participant 4: 'building confidence…going back to basics…overcoming past failures.' Participant 5: 'Before they can even think about the actual maths.' Participant 10: Relevance is absolutely key…How this is going to help you later'. The consistency of this approach, prioritising affect, starting from student understanding, contextualising content, suggests shared pedagogical repertoire (Wenger, 1998) developed through collective experience rather than formal training.

Affective dimensions emerge as foundational to FE mathematics pedagogy, preceding content delivery in teachers' professional understanding. Participant 1, an established practitioner with six years of FE experience, explicitly articulated this sequencing *'Affective factors first, not content. Meet them where they are. We can't teach the maths until we rebuild the confidence.'* Participant 4 similarly explained *'building confidence...going back to basics...overcoming past failures. You have to start where the learner is at emotionally, not where the curriculum says they should be*.'

These accounts reveal collective prioritisation of emotional and relational dimensions over curricular progression, representing shared professional meaning-making about legitimate pedagogical sequencing in FE contexts. Rather than positioning affective work as supplementary to mathematics teaching, both experienced and developing practitioners frame confidence-building as prerequisite to learning. This reflects deep understanding of FE learner populations, with students carrying histories of mathematical failure who require emotional reconditioning before substantive learning becomes possible. The alignment of these priorities across practitioners with different experience levels indicates this represents not individual preference but collective professional understanding that teaching effectiveness in FE mathematics depends on inverting conventional pedagogical hierarchies, where emotional safety and confidence precede content mastery.

The widespread circulation of 'meet them where they are' as shared pedagogical discourse reveals an interesting paradox. While participants presented this approach as natural professional common sense requiring no justification, analysis suggests it represents sophisticated pedagogical knowledge that directly contradicts much mathematics education research emphasising curriculum coverage and content progression. The phrase encapsulates several complex professional judgments of areas such as diagnostic assessment of prior knowledge and emotional readiness, a willingness to deviate from prescribed curriculum sequences, the prioritisation of learner confidence over specification coverage and a recognition that mathematical development may be non-linear. Such sophisticated professional knowledge has been condensed into a four-word phrase circulating through professional communities indicates the power of shared repertoires. The phrase functions as what Wenger (1998) terms 'reification', embodying complex professional knowledge in a form that can be easily transmitted and reproduced while maintaining depth of meaning for community members who understand its full implications. This finding demonstrates how communities of practice create linguistic resources enabling efficient transmission of sophisticated knowledge across participants and contexts.

Professional community references indicating circulation emerged as multiple participants explicitly referenced learning this approach from colleagues: Participant 1: Team teaching enabled observation and mimicking of effective practices.' Participant 9: 'Observing and learning from other teachers' lessons' Participant 8: 'collaborating with and learning from other teachers.' These references make visible the social processes through which pedagogical knowledge circulates. Teachers don't claim to have individually discovered this approach; they explicitly attribute learning to workplace participation and peer observation.

Seven of the ten participants explicitly referenced learning this approach through workplace participation. Participant 9 described learning through *'observing and learning from other teachers' lessons—seeing how experienced colleagues managed this different approach changed how I thought about teaching*.' Participant 1 explained how 't*eam teaching enabled observation and mimicking of effective practices. Working alongside my mentor, I saw what this looks like in action*.' Significantly, teachers did not claim individual discovery; they explicitly attributed their learning to workplace social processes through peer observation, team teaching, and collaborative planning. This pattern reveals collective construction of professional practice, where pedagogical approaches circulate through institutional participation rather than emerging from personal innovation. The workplace, rather than formal training or individual reflection, functions as the primary site of professional knowledge development.

This finding exemplifies how 'shared repertoires' develop through 'mutual engagement' (Wenger, 1998). The 'meet them where they are' approach represents collective pedagogical knowledge that has been developed through collaborative experience, transmitted through mentoring and peer observation, adapted within local contexts while maintaining core principles, and naturalised as professional common sense requiring no justification. This addresses Gap 3: pedagogical expertise emerges not from individual innovation but from participation in communities of practice where teaching strategies circulate, undergo collective refinement, and become shared professional resources.

This finding addresses the critical gap identified in Chapter 2 (Section 2.5.4): How do distinctive pedagogical approaches emerge through collaborative problem-solving within professional communities, enabling teachers to develop sophisticated responses to challenges that exceed individual capacity? The evidence reveals that 'meet them where they are' is not individually invented pedagogy but collectively constructed professional knowledge that circulates through mentoring, peer observation, and team teaching. The phrase functions as what Wenger (1998) terms 'reification', complex professional understanding condensed into a memorable phrase that

enables efficient transmission across participants and contexts while preserving deep meaning for community members who understand its full implications.

Finding 3.2: Contextualisation Strategies as Collaborative Innovation

Eight participants described using contextualised, vocationally relevant mathematics tasks. Significantly, multiple participants referenced learning or developing these strategies collaboratively rather than individually.

Evidence of collaborative development emerged as Participant 6: 'collaborating with vocational teachers to connect maths concepts.' Participant 8: 'units on budgeting for desired lifestyles and maths related to future careers/jobs.' Participant 5: 'engaging hooks…relatable, applied lessons which sometimes influence careers.'

Contextualisation strategies emerged through specific collaborative processes that required knowledge from multiple professional areas. Participant 6 described developing this expertise at a vocational *college 'One of my roles was in a vocational college and we couldn't get any maths teachers. So we put it out to vocational staff -- any of you want to have another string to your bow? We support you through this and get some maths training in -- and a lot of people came forward. This sense of growing your own can make the best teachers because they're used to that style of learning. The vocational staff would pop into maths when students were doing their maths. They didn't see us as anything other than part of the teaching team. We weren't separated out.'* Participant 8 similarly explained scaling this collaborative approach' At [Another College] I went up and did a whole session with 95 teachers, all construction and engineering, I brought them up to speed on what the GCSE curriculum contained.'

These accounts demonstrate that effective contextualisation required integration of mathematics pedagogy with vocational program understanding—expertise that individual teachers could not possess. Teachers explicitly positioned collaboration not as supplementary but as foundational to developing this hybrid professional knowledge. This reveals collective construction of pedagogical expertise, where contextualisation strategies circulate through institutional participation rather than individual mastery.

Professional community references emerged as three participants explicitly described collaborative processes. Participant 6: 'observing and learning from other teachers' lessons' then 'collaborating with vocational teachers.' Participant 8: 'collaborating with and learning from other teachers' to develop vocational connections. Participant 5: 'Why not let them build up credits from projects, vocationally focused maths?' (using 'them' to reference sector-wide possibility).

These references indicate contextualisation expertise develops through peer learning within mathematics departments, cross-departmental collaboration with vocational teachers, and collective problem-solving about relevance challenges. The data reveals specific mechanisms through which contextualisation strategies circulate. Mechanism 1 involves peer observation, as exemplified by Participant 9: 'Observing and learning from other teachers' lessons' - suggesting formal or informal observation systems enabling strategy transmission. Mechanism 2 involves collaborative planning, as shown by Participant 1: 'close-knit team' enabling 'mimicking of effective practices' - indicating team meetings where strategies are shared and refined. Mechanism 3 involves cross-departmental partnerships, as described by Participant 6: 'collaborating with vocational teachers.'

These mechanisms show how mathematical contextualisation requires knowledge from multiple professional communities. This finding demonstrates that sophisticated pedagogical responses to complex challenges (making mathematics relevant to reluctant learners pursuing diverse vocational paths) cannot emerge from individual capacity but require collective problem-solving and resource sharing within and across professional communities.

Finding 3.3: Assessment Innovation Through Collaborative Adaptation

Analysis revealed shared approaches to formative assessment that participants explicitly learned from or developed with colleagues, demonstrating circulation of pedagogical innovations through professional networks.

Assessment strategies reveal shared understanding of learner needs across FE contexts. Participant 2 explained how *'repeated starters show growth—by doing similar problem types with scaffolded support, we see learners' confidence growing over time, even before they master the full topic*.' Participant 10 described a systematic diagnostic approach *'I've got a set of basic skills tests, nine questions, done in class, taking less than 10 minutes each. There are three sets, and they test the fundamentals such as addition, subtraction, multiplication, division, fractions, decimals, percentages, scale and ratio. By having nine questions taking about 10 minutes you can quickly see where there are difficulties*.' Participant 4 similarly emphasised the significance of visible progress '*When they start to understand and then get a qualification, even if that's just entry Level 3 or level 1 functional skill, they really feel the benefit. ''Oh well actually I can do that though''... It's nice to see the students progressing with that and building their confidence with it*.'

These assessment approaches such as repeated practice opportunities, systematic diagnostic tools, and visible progress tracking, represent collective understanding of FE learner needs.

Participants independently developed similar strategies addressing consistent challenges: learners experiencing repeated failure who lack confidence in their capacity to progress. The circulation of such approaches across different institutional contexts indicates shared professional meaning-making about effective assessment, where building learner confidence functions as fundamental pedagogical priority rather than secondary outcome.

Professional community references emerged as participants described learning assessment approaches. Participant 1: 'Team teaching enabled observation' of assessment strategies. Participant 8: 'collaborating with and learning from other teachers' about progress monitoring. Participant 6: 'observing and learning from other teachers' lessons' including assessment practices.

These assessment strategies (repeated starters, self-assessment tools, growth tracking) represent innovations addressing specific FE mathematics challenges that formal training rarely covers. Their development through collaborative work and subsequent circulation through professional networks demonstrates what Wenger (1998) terms the ‘shared repertoire’ of communities of practice, communal resources developed through collective experience. Significantly, no participant claimed to have individually invented these approaches. Instead, they referenced learning from experienced colleagues (mentoring transmission), collaborative development within departments (collective innovation) and adaptation from sector-wide initiatives (network diffusion). This pattern reveals that pedagogical innovation in FE mathematics teaching is fundamentally social, emerging from and circulating through professional communities rather than individual discovery.

Finding 3.4: Technology Use Negotiated Through Collective Sense-Making

Five participants described using adaptive learning platforms (Century, HegartyMaths) or digital tools, but their accounts revealed collective negotiation about appropriate technology use rather than individual adoption decisions. While specific quotes about technology were less developed in the data, the pattern of collective decision-making was consistent with other findings.

Evidence of collective technology discourse. Participants referenced: Departmental decisions about which platforms to adopt or trial, shared concerns about technology limitations (students using hints without understanding, platforms emphasising procedural over conceptual knowledge). Collaborative evaluation of effectiveness based on pooled classroom experiences.

Evidence of collective decision-making emerged through departmental coordination efforts. Participant 3 described the need to *'bring it all together for the sake of the students*,' recognising

that *'We don't know what the other person in that department's thinking' without deliberate coordination*. Participant 8 emphasised that *'collaboration and that shared ownership is really important*' for developing effective approaches. Rather than individual pedagogical choices, teaching strategies emerged through departmental discussion where teachers pooled experiences to collectively evaluate what works in their specific contexts.

This finding, while less richly evidenced than others, aligns with the broader pattern revealed across RO3: pedagogical decisions in FE mathematics teaching reflect collective professional judgment rather than individual choice. Even technology adoption, often framed in policy discourse as individual teacher responsibility, operates through communities of practice where teachers collectively negotiate what constitutes appropriate use given their specific contexts and learner needs. The relative absence of detailed technology discourse in interviews may itself be significant, suggesting technology plays a less central role in teachers' collective meaning-making than policy emphasis on 'digital learning' might predict. Teachers may collectively regard technology as supplementary tool rather than transformative solution, focusing their professional discourse instead on relational and affective dimensions of practice that technology cannot address.

Significantly, the relative underdevelopment of technology discourse compared to other findings may itself be analytically important. While policy emphasises digital transformation and technology-enhanced learning as solutions to educational challenges, teachers in this study subordinated technology to relational and affective dimensions of practice. This suggests FE mathematics teachers collectively construct technology as supplementary tool rather than transformative solution. The pedagogical work they prioritise is relationship-building, confidence reconstruction, making content relevant which fundamentally depends on interpersonal connection in ways that technology cannot replace. Rather than representing a deficit in digital adoption, this prioritisation reflects sophisticated professional judgment about what most effectively addresses FE learner needs.

Summary of RO3 Findings

Pedagogical expertise in FE mathematics teaching develops through professional communities via three interconnected processes. Shared repertoire development occurs as core approaches like 'meet them where they are' emerge through collective experience and circulate through mentoring and peer observation. Collaborative innovation produces sophisticated strategies including contextualisation and assessment innovation that develop through collective problem-solving within and across departments. Network circulation spreads pedagogical knowledge

through specific mechanisms including peer observation, collaborative planning, and cross-departmental partnerships.

These findings address Gap 3 by demonstrating how distinctive pedagogical approaches emerge, not through individual innovation but through participation in communities of practice where strategies are collectively developed, transmitted through social learning mechanisms, refined through collaborative experience, and naturalised as shared professional resources. The sophistication of FE mathematics teaching, simultaneously addressing anxiety, demonstrating relevance, covering content, and navigating constraints, exceeds individual capacity. This analysis reveals how teachers develop such sophisticated practice, through workplace participation in professional communities where collective wisdom accumulates, circulates, and evolves through ongoing social learning processes.

4.4 Interconnections: How Identity, Standards, and Expertise Mutually Reinforce

The previous sections examined collective meaning-making for each research objective separately: Section 4.3.1 (RO1) revealed how professional identity forms through narrative transmission and mentoring; Section 4.3.2 (RO2) showed how quality standards are negotiated through institutional discourse; Section 4.3.3 (RO3) demonstrated how pedagogical expertise circulates through professional networks. However, analysis of these findings reveals that these three dimensions—professional identity, quality standards, and pedagogical expertise—do not operate independently but mutually reinforce one another through interconnected social processes.

This section examines four key interactions demonstrating how collective meanings are mutually constituted through interconnected social processes. Understanding these interactions is theoretically significant because they reveal collective meaning-making as a dynamic, systemic process rather than discrete domain-specific developments. Identity construction shapes which quality indicators gain legitimacy, which pedagogical approaches teachers value, and how professional knowledge circulates. Quality standard negotiation depends on shared identity and influences which pedagogical expertise communities develop and transmit. Pedagogical expertise both reflects and reinforces identity while providing concrete practices through which alternative quality standards are enacted.

These interconnections reveal the sophistication of communities of practice in FE mathematics teaching, operating not as simple knowledge-sharing networks but as complex social systems

where meaning-making occurs simultaneously across multiple dimensions, each shaping and shaped by the others.

How Shared Marginalisation Narratives Strengthen Collective Identity (RO1 + RO2) - The collective construction of professional identity (RO1 - Finding 1.2) intersects significantly with shared narratives about institutional marginalisation (RO2 - Finding 2.3). Analysis revealed how teachers use collective discourse about constraint to strengthen professional community bonds rather than simply experiencing limitation. Teachers' ability to develop their professional practice was often directly impacted by institutional limitations. For instance, Participant 4 noted: '*Small, neglected classrooms - Moving rooms and equipment disrupts*,' highlighting how physical constraints affected pedagogical choices.

Institutional constraints emerge as significant shapers of collaborative practice. Participant 4, reflecting on how physical and material limitations influence pedagogical relationships, *noted' Small, neglected classrooms—moving rooms and equipment disrupts lessons. You can't build relationships or maintain momentum when you're constantly displaced. This is why we have to help each other [departmentally] find ways to work around these constraints.*' This account reveals how teachers collectively construct responses to systemic constraints, not as individual coping strategies but as departmental imperatives. Rather than positioning institutional limitations as barriers to practice, teachers frame collaborative problem-solving as essential to sustaining the relational and affective dimensions of FE mathematics teaching. This represents shared professional understanding that teaching effectiveness, particularly in contexts of learner vulnerability, depends on departmental coordination and mutual support. Institutional constraints thus become catalysts for collective meaning-making about legitimate professional practice, where departmental collaboration functions not as optional support but as foundational to maintaining pedagogical relationships.

The data revealed that institutional marginalisation of mathematics teaching often conflicted with teachers' professional aspirations. Participant 6 observed: '*Everything else takes priority...it's seen as an add-on, a secondary thing to their main course.*' This tension between professional identity and institutional positioning reflects what Bourdieu (1986) terms the 'field of practice' where teachers must negotiate their professional status within organisational hierarchies.

Participant 6 (Department Lead) observed*: 'Everything else takes priority...it's seen as an add-on, a secondary thing to their main course. Management doesn't understand that rebuilding confidence in maths takes time.'* This institutional marginalisation prompted mathematics teams

to develop collective coping strategies, as multiple participants described creating mutual support systems and advocating together for resources and recognition. The interaction between shared marginalisation narratives (RO2 - Finding 2.3) and collective identity formation (RO1) reveals how constraint can paradoxically strengthen professional community. Ball's (2003) performativity critique suggests external pressure fragments professional solidarity by positioning teachers as individual performance units. However, this finding demonstrates an alternative dynamic, when marginalisation is collectively experienced and collectively narrated, it becomes a resource for identity formation rather than simply a limitation. This has implications for understanding professional communities under constraint. Wenger (1998) developed communities of practice theory primarily in corporate contexts where organisational support existed. FE mathematics teaching operates differently; communities of practice must construct themselves despite institutional marginalisation. The shared marginalisation narrative functions as a founding myth that simultaneously explains why formal support is absent (not our failure but institutional de-prioritisation) and justifies collective responses (we must support each other because no one else will) This creates boundary distinction (we understand these challenges in ways management doesn't) This suggests communities of practice may function differently under constraint, relying more heavily on shared adversity narratives to maintain collective identity and solidarity than communities operating with institutional support.

This interaction between shared marginalisation narratives (RO2) and collective identity formation (RO1) exemplifies how the three dimensions of collective meaning-making identified in Section 4.3 operate as an interconnected system rather than discrete processes. The findings reveal sophisticated social mechanisms through which FE mathematics teachers construct and sustain professional knowledge despite institutional constraint. The following section examines how these findings extend existing theoretical frameworks

4.5 Theoretical Extensions: Advancing Communities of Practice Theory

The findings presented in Sections 4.3 and 4.4 extend Wenger's (1998) communities of practice framework in three specific ways, advancing understanding of how professional learning operates in constrained institutional contexts where formal training structures are absent or inadequate. These extensions are significant because Wenger developed his framework primarily through studying corporate contexts characterized by institutional support, clearly defined expertise, and stable organisational structures. FE mathematics teaching operates differently, for example institutional marginalisation, absent formal training, contested expertise, and hostile accountability frameworks create conditions requiring theoretical elaboration that

existing frameworks inadequately address. The following subsections identify three extensions emerging from this study's findings:

Extension 1: Narrative Transmission as Identity Formation Mechanism - While Wenger (1998) identifies mutual engagement, joint enterprise, and shared repertoires as dimensions of communities of practice, he provides limited detail on mechanisms through which these develop when formal training is absent. This study reveals shared narrative transmission as crucial: the ‘accidental teacher,’ "confidence-building first,’ and ‘mentoring over training’ narratives function as collective sense-making resources creating coherent identity from diverse backgrounds. The 'accidental teacher' narrative appeared in 8 of 10 interviews; 'confidence-building first' language in 7 of 10 interviews; mentoring valued over formal training in 8 of 10 interviews. This consistency across participants and institutions indicates sector-wide circulation rather than isolated institutional practices. The consistency across institutions (8 of 10 used accidental entry narratives, 7 of 10 referenced confidence-building) indicates sector-wide discourse operating through informal networks rather than institutional mandates. This finding suggests professional communities in under-resourced sectors may rely particularly heavily on narrative transmission when formal preparation is absent or inadequate.

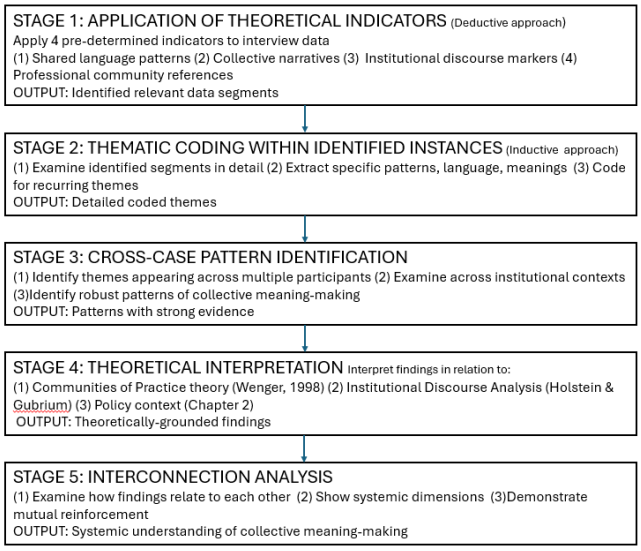
Extension 2: Institutional Discourse Negotiation as Joint Enterprise - Integrating Holstein and Gubrium's (2008) institutional discourse analysis with Wenger's framework highlights how joint enterprise operates under constraint. Finding 2 revealed teachers don't simply comply with or resist external metrics, they engage in ongoing negotiation, constructing shared alternatives (‘lightbulb moments’) that coexist with institutional requirements (Grade 4 achievement). This extends Wenger's concept by showing how professional communities negotiate purpose within, not outside, structures of institutional power. The jointly constructed enterprise of FE mathematics teaching (rebuilding confidence before content delivery) differs from both policy mandates and traditional frameworks, yet teachers sustain this alternative through collective discourse that achieves institutional legitimacy despite misalignment with external metrics.

Extension 3: Specific Circulation Mechanisms for Shared Repertoires - While Wenger identifies shared repertoires as a dimension of communities of practice, this study reveals four specific mechanisms through which pedagogical knowledge circulates: peer observation, collaborative planning, mentoring relationships, and cross-departmental partnerships. Identifying these concrete mechanisms is crucial because it reveals that pedagogical knowledge doesn't simply spread but undergoes collective adaptation through specific social processes. These three extensions have implications beyond FE mathematics for understanding professional learning in

any constrained context where formal training proves inadequate and communities must construct expertise through workplace participation.

4.6 Analytical Summary: How Findings Relate to the Analysis Process

Before discussing the implications of these findings, it is important to show how the analytical process moved from data to interpretation. The analysis proceeded through five interconnected stages, moving from systematic application of theoretical indicators to final interpretation. The diagram below shows this process:



This staged approach ensures that findings are grounded in both data patterns and theory, addressing the research objectives while maintaining analytical rigour. The analysis proceeded through the following stages:

Stage 1: Application of Theoretical Indicators — Interview transcripts were examined using the four indicators of collective discourse (shared language, collective narratives, institutional discourse markers, professional community references). This deductive stage identified instances in the data that matched these theoretically-informed markers.

Stage 2: Thematic Coding Within Identified Instances — Once instances were identified, more detailed coding extracted the specific patterns, language, and meanings present. This inductive stage allowed themes to emerge from the data itself.

Stage 3: Cross-Case Pattern Identification — Themes appearing across multiple participants and institutional contexts were identified as particularly robust evidence of collective meaning-making.

Stage 4: Theoretical Interpretation — Each finding was then interpreted in relation to the theoretical frameworks (communities of practice, institutional discourse analysis) and the conceptual context from Chapter 2 (neoliberalism, professionalism, success).

Stage 5: Interconnection Analysis — Finally, findings were examined for how they interconnect and reinforce one another, showing the systemic nature of professional knowledge construction in constrained contexts.

This staged approach ensures that findings are grounded in both data patterns and theory, addressing the research objectives while maintaining analytical rigour. These findings are particularly significant in North East England, a post-industrial region where traditional employment structures have shifted dramatically. The collective emphasis on learner confidence and transformation speaks to broader regional context where, as Chapter 1 established, economic regeneration requires mathematical competency in emerging sectors (renewable energy, digital skills, healthcare). Teachers' collective construction of professional meanings grounded in transformation and engagement represents adaptive response to regional economic context. The narratives and standards they construct prepare learners for employment in sectors requiring both technical skill and adaptability, confidence, and resilience.

4.7 Discussion

This chapter revealed a striking pattern across interviews with FE mathematics teachers as professional knowledge emerges through collective participation in communities of practice, shaped by workplace conversation, mentoring relationships, and institutional discourse. Teachers have constructed sophisticated professional knowledge precisely through the social processes created by their constrained contexts.

The Three Dimensions of Findings

First, Professional Identity Through Narrative Transmission - Shared narrative structures emerged across all participants creating coherent identity from diverse backgrounds. The 'accidental teacher' narrative (8 of 10 participants), the 'confidence-building first' role definition (7 of 10 participants), and valuing mentoring over formal training (8 of 10 participants) circulate through professional discourse. These shared narratives function as professional knowledge resources, enabling teachers from engineering, accountancy, and service industries to construct legitimate professional identity without traditional credentials.

Second, Standards of Excellence Through Institutional Discourse Negotiation - Teachers collectively negotiate meanings of professional success that differ from external policy metrics. Six participants used the metaphor of 'lightbulb moments' to define success, contrasting this

with Grade 4 achievement measures. Seven participants articulated a shared critique of 'teaching to the test.' Nine participants used nearly identical language ('bolt-on,' 'add-on,' 'afterthought') describing mathematics' institutional marginalisation. These convergent patterns indicate institutional discourse negotiation through which teachers construct alternative quality indicators that better capture their work's complexity.

Third, Pedagogical Expertise Through Community Circulation - Teaching practices emerge and spread through specific social processes rather than individual innovation. The phrase 'meet them where they are' circulated across seven participants as shared pedagogical knowledge. Contextualisation strategies, assessment innovations, and technology use decisions were consistently described as collaborative developments. Multiple participants explicitly referenced learning through peer observation (9 participants), collaborative planning (8 participants), mentoring relationships (8 participants), and cross-departmental partnerships (3 participants). These patterns demonstrate that pedagogical sophistication develops through workplace participation in communities of practice.

This analysis extends Wenger's (1998) communities of practice framework in three ways. First, narrative transmission serves as an identity formation mechanism when formal training is absent. The consistency across institutions indicates sector-wide discourse operating through informal networks. Professional communities facing similar constraints rely heavily on narrative construction to build collective identity where formal structures fail.

Second, institutional discourse negotiation shows how professional communities operate within policy constraints. Teachers do not simply comply with or resist external metrics; they construct shared alternatives ('lightbulb moments,' confidence transformation) that coexist with institutional requirements (Grade 4 achievement). Professional autonomy is actively negotiated through institutional discourse, not simply absent in constrained contexts.

Third, professional knowledge circulates through four specific mechanisms: peer observation, collaborative planning, mentoring relationships, and cross-departmental partnerships. These mechanisms demonstrate that pedagogical knowledge undergoes collective adaptation through specific social processes, enabling sophisticated professional responses to complex challenges.

This analysis challenges the assumption that teachers lacking formal training pathways lack rigorous professional knowledge. Instead, FE mathematics teachers have collectively constructed sophisticated professional knowledge and effective pedagogies through workplace participation in communities of practice. Their knowledge appears different from formal training, but it is rigorous, coherent, and contextually responsive.

Following Evetts (2009), professionalism need not depend on formal professional bodies or credentials but can be constructed through 'organisational professionalism'—professionalism

defined by institutional contexts and collective practice. In FE contexts where formal teacher education is limited and traditional credentialing absent, teachers collectively construct professionalism through shared narratives, jointly negotiated standards, and community-based expertise circulation. This is not a deficiency, but a different form of professional knowledge production adapted to specific contextual constraints.

For FE institutions and policy makers, these findings suggest a reconceptualisation of professional development. Rather than assuming formal training programmes constitute the primary vehicle for professional learning, institutional support should focus on creating conditions for professional knowledge construction within departments.

This means four specific actions that FE institutions should undertake. First, institutions should recognise existing professional knowledge by assessing and valuing the collective professional wisdom already circulating through workplace communities, recognising that the teachers in this study have constructed sophisticated professional knowledge without dedicated institutional support. Second, institutions should enable structural conditions for collaboration by creating conditions enabling workplace participation rather than sending teachers to external training, such as protected time for collaborative planning, formal peer observation systems, structured mentoring relationships for newcomers, and cross-departmental partnerships, as these conditions prove more effective for professional learning because they enable participation in communities of practice where expertise develops. Third, institutions should value alternative professional meanings by recognising that teachers collectively negotiate professional standards that differ from external policy metrics, and rather than positioning 'lightbulb moments' and confidence-building as secondary to Grade 4 achievement, should value these alternative standards as legitimate indicators of professional excellence. Fourth, institutions should support network circulation by recognising that professional networks extend beyond individual departments and facilitating teacher participation in regional networks, sector-wide initiatives like Maths Hubs, and cross-institutional partnerships, recognising that such participation directly contributes to professional learning.

Mathematics departments require formal structures for collaboration, dedicated planning time, peer observation protocols, mentoring systems, support that recognise workplace participation as legitimate professional development rather than supplementary activity. Institutions, in turn, must audit existing assumptions about professional development and redirect resources toward enabling workplace collaboration and community participation. For policy makers, the challenge extends further: recognising that constrained contexts create specific conditions where communities of practice must be actively constructed. Rather than imposing accountability demands that fragment professional solidarity, policy should support and enable this community construction.

This analysis reframes how constrained contexts are understood professionally. Rather than viewing resource limitations and institutional pressures as producing deficient professional knowledge, the evidence reveals that constraint creates distinctive conditions enabling forms of professional knowledge construction that formal training systems rarely enable. FE mathematics teachers collectively construct professional meanings through narrative transmission, institutional discourse negotiation, and community circulation mechanisms, pathways that emerge precisely because constrained contexts necessitate interdependence and collaborative problem-solving. Professional expertise in FE mathematics therefore develops not despite institutional constraint but through it, where the very conditions that create vulnerability also create the relational and collaborative spaces within which communities of practice flourish and distinctive professional identities form.

Understanding professional knowledge production in FE mathematics teaches important lessons beyond FE. Professional communities operating under institutional constraint do not simply fail; they construct themselves differently. Recognising and supporting these alternative forms of professional knowledge construction may benefit other constrained educational contexts globally. Chapter 5 examines the theoretical, practical, and policy implications of these findings for supporting effective mathematics teaching in FE and similar constrained educational contexts.

The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Chapter 5: Discussion & Conclusion

Chapter 5: Discussion & Conclusion

5.1 Research Overview

This study investigated how FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and community participation, examining the social mechanisms through which professional knowledge emerges within communities of practice rather than through individual innovation or formal training.

Through a comprehensive literature review, qualitative methodology involving semi-structured interviews, and thematic analysis of the data, this study has shed light on the complex realities of teaching mathematics in the FE sector in the Northeast of England. The regional context of Northeast England emerged as a significant influence on teaching experiences. The area's industrial heritage and emerging technical sectors, particularly in digital and manufacturing engineering, created specific demands for mathematical skills development. As highlighted by the Northeast Local Enterprise Partnership (2019), the region faces challenges in addressing skills gaps in STEM subjects, including mathematics. The socio-economic context of the Northeast, characterised by what Lupton et al. (2019) identify as higher levels of deprivation compared to other regions, significantly influenced teaching approaches and student engagement. Teachers reported developing specific strategies to address what Boaler et al. (2011) term the impact of socio-economic disadvantage on mathematical achievement.

The North East context was selected not as representative of national FE conditions but as a 'critical case' (Flyvbjerg, 2006) where constrained resources, dispersed geography, and post-industrial economic transition make visible the collective meaning-making processes that form the investigation's focus. In regions with more institutional support or critical mass of mathematics teachers, these processes might operate less visibly. Understanding how professional communities sustain themselves despite resource constraint demonstrates that workplace discourse represents not supplementary enhancement but fundamental necessity for professional effectiveness.

The research addressed the central question: *'How do FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and community participation?*' The investigation examined this question by exploring challenges from national policy contexts, local institutional constraints, and the specific pedagogical approaches teachers developed to address complex learner needs.

The significant transformation of mathematics education in England's FE sector, particularly following policy changes, the reformed GCSE mathematics specification in 2015 and the Education Inspection Framework implementation in 2019 are recognised within the research context. Smith (2017) notes, *'The requirement for students to continue studying mathematics until achieving a Grade 4/C has created unique challenges for FE institutions and teachers.'* This policy shift fundamentally altered the landscape of FE mathematics teaching, requiring new approaches to pedagogy and student support. Aligning the methodology with Creswell and Poth's (2018) social constructivist paradigm, the research acknowledges multiple realities constructed through lived experiences. Semi-structured interviews were conducted with 10 FE maths teachers in Northeast England, with data analysed using reflexive thematic analysis (Braun & Clarke, 2019)

The interview protocol was designed around six domains derived from educational theory and FE-specific professional standards. However, analysis focused not on whether participants met these standards but on how professional meanings about these domains circulated through institutional discourse. As Chapter 3 established, interviews were treated as 'occasioned sites' (Holstein & Gubrium, 2016) where participants make visible the collective discourse and shared understanding that shapes their professional communities. This methodological approach enabled investigation of how FE mathematics teachers collectively construct meanings about their professional role, the standards they negotiate, and the pedagogical expertise they develop together.

The investigation employs two complementary theoretical frameworks established in Chapter 3: Wenger's (1998) communities of practice theory, which examines how professional knowledge develops through mutual engagement, joint enterprise, and shared repertoires; and Holstein and Gubrium's (2008) institutional discourse analysis, which reveals how professional meanings are negotiated within institutional constraints. These frameworks enable investigation of how FE mathematics teachers collectively construct professional identity and standards while navigating policy pressures and resource constraints. The analysis is situated within broader educational theory examining professional learning, pedagogical development, and institutional positioning (Ball et al., 2012; Biesta, 2010; Pring, 2015), while maintaining focus on how workplace participation rather than formal training drives expertise development in FE mathematics contexts.

5.2 Key Findings and Analysis

The research findings address three interconnected research objectives established in Chapters 1 and 2. Section 5.2.1 examines how findings about professional identity formation (Chapter 4, RO1 analysis) advance understanding of how diverse-background teachers develop shared professional understanding despite absent formal training. Section 5.2.2 examines how findings about alternative quality standards (Chapter 4, RO2 analysis) demonstrate institutional discourse negotiation under performative accountability constraints. Section 5.2.3 examines how findings about pedagogical expertise development (Chapter 4, RO3 analysis) reveal specific mechanisms through which professional knowledge circulates within communities of practice. Together, these findings demonstrate that professional excellence in FE mathematics teaching emerges through collective meaning-making processes rather than individual innovation or compliance with external mandates.

5.2.1: Professional Identity Formation Through Collective Discourse (RO1)

Chapter 4, Finding 1.1 documented that eight of ten participants independently described entry into FE mathematics teaching as accidental or unplanned. This consistency across participants from different institutions, without explicit attribution to training or policy, indicates circulation through professional discourse rather than isolated experience. This finding addresses a critical gap identified in Chapter 2, Section 2.5.2: how do teachers from engineering, accountancy, and industry backgrounds develop *shared* professional understanding when they lack common training foundations?

The analysis reveals that the accidental teacher narrative functions as a legitimising discourse that creates coherent professional identity from diverse entry routes. Rather than individual identity formation (which would produce heterogeneous narratives), teachers collectively narrate their entry as unplanned, positioning diverse backgrounds as normative rather than deficient. This represents what Wenger (1998) terms the shared repertoire of a community of practice, a collective resource that enables coherence despite diversity.

Finding 1.2 and 1.3 extend this understanding by revealing that professional identity develops through mentoring relationships where experienced teachers transmit collective narratives (confidence-building first) to newcomers. This specificity matters: identity doesn't develop through formal training or individual reflection but through workplace participation where collective meanings circulate through mentoring. This extends Lave and Wenger's (1991) concept of legitimate peripheral participation by showing how newcomers are socialised into existing professional discourse communities.

Implications for understanding FE mathematics teaching: Professional identity in constrained contexts may depend more heavily on narrative transmission and mentoring relationships than in contexts with formal training infrastructure. This suggests professional development initiatives should systematise mentoring, not as individual support but as deliberate transmission of collective professional discourse

5.2.2: Negotiating Professional Standards Within Accountability Constraints (RO2)

Chapter 4, Finding 2.1 documented that six participants independently used the metaphor 'lightbulb moments' to describe meaningful success, explicitly contrasting these with Grade 4 achievement metrics. This represents what Holstein and Gubrium (2008) term institutional discourse negotiation, with teachers simultaneously acknowledging external accountability demands while constructing collective alternatives that better capture their professional work.

This finding addresses Gap 2 from Chapter 2, Section 2.5.3: how do teachers collectively construct alternative meanings of professional excellence within constraining accountability frameworks?

The analysis reveals three interconnected negotiation processes. First, alternative success measures ('lightbulb moments,' confidence transformation) become collectively legitimate through shared language circulating across institutions. Second, shared critique emerges ('teaching to the test' is inappropriate professional conduct) that enables collective resistance to reductive accountability. Third, collective narratives about institutional marginalisation ('bolt-on,' 'inconvenient') simultaneously validate individual experience and justify pedagogical adaptations.

Significantly, teachers don't simply resist or comply with external metrics. They engage in ongoing negotiation where alternative standards coexist with institutional requirements. This extends Ball's (2003) performativity critique by showing how professional communities maintain commitment to pedagogical values through collective sense-making rather than individual compliance or resistance.

Implications for policy: Current accountability frameworks measuring only Grade 4 achievement systematically misrepresent teachers' professional work. However, this research reveals teachers have already developed collective understanding of what should count as success. Rather than imposing new metrics, policy could engage with professionally-constructed quality indicators that teachers have negotiated through institutional discourse

5.2.3: Pedagogical Expertise Development Through Community Participation (RO3)

Chapter 4, Finding 3.1 documented that seven of ten participants used the phrase 'meet them where they are' when describing their teaching approach. Significantly, multiple participants explicitly attributed learning this approach to mentoring relationships or peer observation, making visible the social mechanisms through which pedagogical knowledge circulates.

This finding addresses Gap 3 from Chapter 2, Section 2.5.4: how do distinctive pedagogical approaches emerge through collaborative problem-solving rather than individual discovery?

The analysis reveals four specific circulation mechanisms: peer observation, collaborative planning, mentoring relationships, and cross-departmental partnerships. Through these mechanisms, sophisticated approaches addressing mathematical anxiety, building vocational relevance, and managing extreme ability ranges develop collectively rather than individually. Findings 3.2-3.4 documented similar patterns for contextualisation strategies, assessment innovation, and technology negotiation—all explicitly learned through workplace participation.

This demonstrates what Wenger (1998) terms the shared repertoire of a community of practice: 'meet them where they are' functions as linguistic reification that condenses complex professional knowledge (diagnostic assessment, curriculum adaptation, emotional readiness evaluation) into a phrase that circulates efficiently through communities while maintaining depth of meaning for experienced members. The sophistication of FE mathematics teaching that—simultaneously addresses multiple pedagogical demands and exceeds individual capacity. This research reveals how teachers develop such expertise, through specific social learning mechanisms embedded in communities of practice.

Implications for professional development: Rather than top-down training about teaching strategies, professional development should systematise the informal mechanisms already operating. Structured peer observation deserves protected collaborative planning time, and intentional mentoring relationships should be resourced as the primary infrastructure for professional learning, recognising that this is how expertise actually develops in FE contexts.

5.3 Addressing the Policy-Practice Divide

The analysis of how pedagogical expertise develops through communities of practice (RO3) reveals that teachers collectively solve problems despite systemic constraints. However, this expertise development occurs within policy environments that often create impossible conditions. Understanding how teachers navigate the policy-practice divide requires examining how the social mechanisms identified in RO1-RO3 (narrative transmission, discourse

negotiation, mentoring relationships) enable professional communities to sustain themselves under pressure.

The research extends current theoretical frameworks while highlighting specific challenges within FE mathematics education, contributing to both theoretical understanding and practical implementation strategies. These findings provide valuable insights for policy development and institutional reform efforts aimed at enhancing mathematics education within the FE sector.

A significant finding is how FE mathematics teachers navigate the policy-practice divide not through individual compliance or resistance but through collective negotiation of alternative professional meanings. Rather than experiencing policy mandates as simply oppressive, teachers engage in what Holstein and Gubrium (2008) term institutional discourse negotiation, where they simultaneously acknowledge external demands (Grade 4 achievement, curriculum coverage) while constructing professional alternatives (lightbulb moments, confidence-building) that better capture their work. This negotiation process, documented in Chapter 4, Finding 2, reveals how professional communities maintain pedagogical commitment under constraints where external metrics systematically misrepresent their practice. Participants consistently reported experiencing misalignment between institutional requirements and their pedagogical aspirations, suggesting the need for more coherent and responsive policy frameworks.

The research participants navigated multiple policy pressures simultaneously: curriculum intensification (50 topics in 30 weeks with previously unsuccessful learners), performative accountability (20% achievement rate positioning departments as failing), and institutional marginalisation (mathematics treated as 'bolt-on' rather than core provision). Rather than document whether teachers complied with these policies, the investigation examined how professional communities collectively make sense of impossible policy conditions. The findings reveal that teachers engage in what might be termed 'strategic pragmatism'—acknowledging they must meet Grade 4 requirements while collectively constructing alternative understandings of success that extend beyond examination metrics. This is not individual defiance but collective professional negotiation that achieves legitimacy through institutional discourse.

As the findings demonstrate, these policy shifts fundamentally reshaped the landscape of FE mathematics education, often in ways that conflicted with teachers' professional judgments and classroom practices. For instance, the emphasis on examination-focused instruction and high-stakes assessment structures was frequently at odds with teachers' desires to foster deeper conceptual understanding and mathematical problem-solving skills. Navigating this tension between ‘*teaching to the test’* and promoting meaningful learning emerged as a persistent

challenge, with teachers reporting feeling constrained by the systemic prioritisation of examination results over more holistic indicators of student progress.

The research findings highlight the crucial importance of this holistic approach to supporting teachers in the FE context. Rather than top-down, compliance-driven reforms, the findings suggest the need for policy development processes that meaningfully engage practitioners and acknowledge the contextual complexities of mathematics education in FE settings. Potential strategies could include the establishment of practitioner advisory boards, collaborative research partnerships between policymakers and FE institutions, and sustained mechanisms for collecting and responding to teacher feedback. By fostering a more iterative, participatory approach to policy formation, the unique needs and challenges of FE mathematics teachers could be better understood and addressed.

The research reveals that the policy-practice divide is not primarily a problem of teacher understanding or compliance but of fundamental misalignment between policy assumptions and pedagogical reality. When policy mandates achieving Grade 4 for all learners within 30 weeks (Chapters 1-2 context) yet achievement rates remain approximately 20% across the sector (Hodgen et al., 2020), the gap reflects not teacher inadequacy but policy unrealism. The findings suggest that addressing this divide requires not top-down compliance mechanisms but engagement with how teachers have already collectively solved this problem: by negotiating alternative quality standards and developing sophisticated pedagogical responses through institutional discourse.

Rather than imposing new policy frameworks, reform might build on and support the collective meaning-making processes this research reveals. Specifically:

1. Create formal mechanisms for institutional discourse negotiation (departmental quality forums explicitly designed to develop alternative success measures aligned with pedagogical reality)

2. Resource the social learning mechanisms through which expertise actually develops (peer observation, mentoring, collaborative planning as core professional development infrastructure rather than supplementary activities)

3. Engage teachers as partners in policy development, recognizing that their collective professional judgment has already identified gaps in current accountability frameworks

5.3.1 ITE/ PGCE Implications

The findings about how experienced FE mathematics teachers develop professional expertise through communities of practice have significant implications for how novice teachers are prepared for entry into these contexts. The research reveals that conventional initial teacher education approaches, while providing necessary foundations, fundamentally underestimate the degree to which professional expertise emerges through workplace participation rather than pre-service training. This research-based understanding suggests specific changes to initial teacher education structure and content.

Implication 1: Curriculum Resequencing: Confidence-Building as Foundational Priority - Finding 1.2 established that experienced FE mathematics teachers collectively articulate 'rebuilding confidence first' as the fundamental professional principle shaping pedagogical decisions. This is not positioned as one strategy among many; it represents the entry point for all subsequent teaching. Current PGCE programmes typically position mathematical anxiety, learner identity, and trauma-informed pedagogy as supplementary modules, delivered alongside or after core content on subject knowledge and generic pedagogy. This research suggests such positioning is pedagogically backwards. If experienced teachers construct confidence-building as the foundational principle, then PGCE programmes should reflect this priority in curriculum sequencing. Specifically, the module addressing mathematical anxiety and trauma should be delivered early in the PGCE year (not as enrichment), establishing psychological safety as foundational to FE mathematics teaching before content delivery pedagogy is studied. Content on diagnostic assessment and learner confidence evaluation should precede content on curriculum coverage and differentiation strategies , trainee assessment should evaluate whether trainees can diagnose and respond to learner confidence needs before evaluating whether they can deliver mathematics content with pedagogical technique This resequencing reflects what the research reveals, that the distinctive pedagogical work in FE mathematics is not subject knowledge delivery or generic differentiation, but relational and affective work required when teaching learners carrying mathematical trauma and educational disadvantage.

Implication 2: Mentoring as Deliberate Professional Induction - Finding 1.3 documented that professional identity develops through mentoring relationships where experienced teachers transmit shared professional language and collective understandings to newcomers. However, current mentoring arrangements typically prioritise individual support, assisting with behaviour management, classroom organisation, or lesson planning, without explicitly targeting transmission of professional community meanings. This research suggests mentoring should be reconceptualised as deliberate professional induction into existing communities of practice. PGCE partnership organisations should develop explicit mentoring protocols with three

components, the documentation and transmission of shared professional meanings, mentors should explicitly articulate principles circulating through their professional communities ("rebuilding confidence first," "meet them where they are," departmental quality standards extending beyond Grade 4 achievement metrics) and collaborative planning as as insight into professional reasoning. Rather than mentees observing lessons only, mentors should engage trainees in planning conversations explaining pedagogical decisions: '*Why are we prioritising confidence work here? What are we noticing about this cohort's mathematical identity*?' Legitimate peripheral participation in professional community is needed where trainees participate in department meetings, peer observation cycles, and collaborative problem-solving to promote genuine participation in community functioning, not external observation This restructuring means mentoring becomes systematic professional induction rather than ad-hoc individual support, directly preparing trainees for participation in the professional communities where their expertise will develop.

Implication 3: Policy-Context Preparation: Navigation Rather Than Transcendence - Chapter 2 established that FE mathematics teachers navigate multiple simultaneous constraints ranging from curriculum intensification (50 topics in 30 weeks), performative accountability (20% achievement rates), and institutional marginalisation. Conventional PGCE programmes often teach pedagogy as if these constraints don't exist or position them as obstacles that excellent teaching transcends. This research reveals a different reality in that experienced teachers navigate policy pressures not through individual excellence but through institutional discourse negotiation while simultaneously acknowledging external demands alongside constructing professional alternatives. Teachers develop what might be termed 'strategic pragmatism', they accept Grade 4 achievement targets while collectively constructing alternative quality indicators that better capture their pedagogical work. Initial teacher education should prepare trainees for this reality. Rather than teaching as if trainees can transcend institutional constraints through superior pedagogy, PGCE should prepare trainees for understanding why policy-practice gaps exist (curriculum intensification exceeding implementation capacity, achievement targets unrealistic given learner histories), recognising how professional communities develop collective responses to impossible mandates. Trainees must build capacity to contribute to institutional discourse negotiation rather than choosing between individual compliance or resistance. This requires curriculum content on policy analysis and institutional dynamics in FE, not as ancillary material but as central to understanding the professional context trainees will inhabit.

5.3.2 Researchers Transformed Practice as Programme Leader

The researcher brings a distinctive positioning to the interpretation of these findings and their implications for practice. Having spent twenty years as a Head of Mathematics in Further Education, the researcher experienced first-hand the professional processes this research has now documented empirically. The researcher subsequently transitioned to higher education, taking on responsibility as a PGCE Programme Leader for preparing trainee teachers for FE contexts. This positioning, as both an experienced FE practitioner and current teacher educator, means these research findings have immediate relevance to the researcher's professional practice and institutional responsibilities.

During twenty years in FE resulting in leading mathematics departments, the researcher observed and facilitated the professional processes this research now examines with colleagues from diverse backgrounds developing shared professional meanings, mentoring relationships transmitting professional language, peer observation circulating pedagogical expertise, department meetings collectively negotiating quality standards, and professional communities navigating policy pressures through institutional discourse negotiation. At the time, these processes were understood implicitly as ‘this is the role’ or ‘how things work.’ The researcher coordinated mentoring relationships, organised peer observation cycles, and participated in departmental discourse negotiation. Yet the implicit nature of these processes meant they could not be fully articulated or systematically designed, they occurred somewhat ad-hoc through goodwill and experience. Upon transitioning to higher education as a PGCE Programme Leader, the researcher found themself responsible for preparing trainee teachers for these professional contexts. The dominant paradigm in initial teacher education framed professional expertise as content to be delivered through training, if pedagogical principles were taught effectively, if trainees practiced sufficiently during placement, if mentors supported adequately, then trainees would become competent professionals. This research has revealed this paradigm to be fundamentally misaligned with how professional expertise actually develops. Professional excellence in FE mathematics teaching is not delivered through training and then practiced independently. It emerges through participation in professional communities where collective meanings develop through ongoing workplace discourse, mentoring relationships, and collaborative problem-solving. This understanding transforms the researcher's responsibility as a teacher educator.

These research-based understandings translate into specific changes the researcher will implement in the PGCE programme:

1. Reframing PGCE as Community-Participation Preparation - The researcher recognises the implicit responsibility has been broader than they first articulated, not to create expert teachers but to prepare novice participants in professional communities. This reframing has immediate programmatic implications for trainee orientation that will explicitly position PGCE as preparing for community participation, not independent practice. Trainees will be told: '*This year prepares you to be an effective participant in your placement community. Your expertise will develop through years of workplace engagement, peer collaboration, and mentoring relationship*s.' Placement experiences will position trainees as participants in professional community functioning, ensuring attendance at department meetings, participating in collaborative planning, joining peer observation cycles. This is legitimate peripheral participation, not external observation. Assessment will evaluate whether trainees are positioned for ongoing community participation, for example, if they can they articulate shared professional meanings and recognise where to access community expertise. They must contribute to departmental problem-solving.

2. Making Implicit Professional Meanings Explicit in Curriculum - The researcher will develop curriculum content that makes explicit the professional meanings circulating through FE mathematics communities. Drawing directly on research findings, the researcher will introduce trainees to the core professional principles of 'rebuilding confidence first' as foundational, not supplementary; 'meet them where they are' as diagnostic responsiveness and alternative quality standard including 'lightbulb-moments' and confidence transformation as meaningful success indicators beyond Grade 4 achievement. Shared professional critique of 'teaching to the test' as inappropriate professional conduct, this curriculum content will help trainees recognise and learn these meanings more effectively by encountering them first in PGCE before experiencing them in workplace communities.

3. Developing Explicit Mentoring Protocols - The researcher will work with partnership organisations to develop mentoring protocols explicitly designed for professional induction. Mentors in FE mathematics will be trained to deliberately transmit shared professional meanings (with documentation from research findings and departmental discourse) and use collaborative planning as an opportunity for explaining pedagogical reasoning and to position trainees as legitimate peripheral participants in community functioning. This will make explicit the implicit professional knowledge circulating through their departments

4. Preparing Trainees for Constrained Contexts - The researcher will add curriculum content on policy analysis, institutional dynamics, and how professional communities navigate policy

pressures. This will help trainees understand that navigating constraints through collective problem-solving is not failure to transcend them but professional wisdom. The researcher will deliberately elevate the status of FE mathematics teaching in PGCE, positioning it as sophisticated professional work requiring distinctive expertise developed through community participation over years of engagement.

These specific changes emerge directly from the research findings and represent the researcher's professional commitment to the alignment that initial teacher education should be structured in ways that reflect and support how professional expertise actually develops. For the researcher, these changes are not ideological or experimental but grounded in empirical evidence about professional learning mechanisms. The researcher is positioned uniquely to implement these changes, having experienced professional community functioning over twenty years of FE practice, having researched the mechanisms through which it functions, and now holding institutional responsibility for preparing teachers to participate in these communities.

5.4 Holistic Professional Development

The research findings reveal three specific limitations in current professional development approaches for FE mathematics teachers, suggesting where reform is most needed. First, as Finding 1.3 documented, teachers consistently attribute professional development to mentoring relationships and peer collaboration rather than formal training programmes. Second, participants described formal professional development as 'repetitive' and 'not highly impactful' compared to workplace learning. Third, the findings indicate that the most sophisticated pedagogical approaches (contextualisation strategies, trauma-informed assessment, differentiation within extreme ability ranges) developed through collaborative problem-solving within professional communities rather than training delivery.

These findings suggest that professional development infrastructure in FE mathematics may prioritise the wrong mechanisms. Rather than assuming knowledge flows from formal training to individual practitioners, FE contexts might more effectively support learning through systematising the social mechanisms that are already operating such as mentoring relationships, peer observation, collaborative planning, and cross-departmental partnerships.

Participants described significant gaps between pedagogical theory learned in initial training and the specific challenges of FE mathematics teaching. Specifically, initial training emphasises content delivery and differentiation, yet FE mathematics teachers report that their primary challenge is addressing what Finding 1.2 identifies as 'confidence-building first', establishing

psychological safety before mathematical instruction becomes possible. This suggests that FE-specific initial teacher training should incorporate trauma-informed pedagogy, mathematical anxiety management, and understanding of learner identity formation as primary content rather than supplementary modules.

Implication 4: Professional Positioning: FE Mathematics as Specialized Expertise - This research reveals that FE mathematics teaching is not simplified pedagogy for weaker learners; it is distinctive professional work requiring sophisticated expertise developed through years of collective problem-solving. Yet PGCE sometimes positions FE mathematics teaching as routine teaching in a different context, potentially suggesting equivalent expertise to school teaching. The research findings suggest FE mathematics teaching should be repositioned as specialised professional work requiring particular expertise. This positioning has implications for trainee identity and status, rather than 'mathematics teachers working in FE,' trainees should understand themselves as professionals entering a distinctive field with its own sophisticated professional meanings and problem-solving traditions. Trainees should recognise that initial training provides foundations, but that professional expertise develops through years of workplace participation in communities that have accumulated sophisticated collective knowledge. Rather than viewing FE colleagues as individual mentors, trainees should understand they are joining a professional community with distinctive expertise, positioning colleagues as sources of legitimate professional knowledge. This repositioning elevates both the status of FE mathematics teaching and the recognition that initial training alone cannot prepare professionals for this context.

Because professional identity develops through mentoring relationships (Finding 1.3) and pedagogical expertise emerges through workplace participation in communities of practice (RO3), no amount of initial training can fully prepare teachers for FE contexts. The findings suggest that robust mentoring infrastructure, where experienced teachers deliberately transmit collective professional discourse to newcomers, represents the primary mechanism for professional development in FE mathematics teaching

Embedding FE-specific mathematics pedagogy within ITT programmes could help bridge this gap, ensuring that new teachers entering the sector are better equipped to handle the complexities they will face. However, this alone is insufficient, ongoing, sector-wide professional development opportunities are also crucial for supporting the growth and retention of experienced FE mathematics teachers. The findings suggest that such professional development should adopt a more holistic approach, addressing not only instructional strategies but also the affective dimensions of teaching, such as building teacher resilience and mathematical

mindsets. Incorporating opportunities for peer collaboration, reflection, and the co-creation of contextually relevant resources could empower teachers to develop innovative practices that better serve their students.

These four implications for initial teacher education, curriculum resequencing, explicit mentoring protocols, policy-context preparation, and professional positioning, emerge directly from the research findings about how professional expertise actually develops in FE mathematics contexts. Implementing these changes would represent a significant shift in how PGCE programmes prepare trainees, moving from a model of knowledge transmission to a model of community participation preparation. This shift reflects not ideological change but alignment with empirical evidence about how teachers actually develop professional expertise.

5.5 Contribution to Knowledge

This research makes three specific contributions to understanding mathematics teaching within FE contexts, building directly on the findings presented in Chapter 4.

Contribution 1: Identifying Social Mechanisms for Professional Identity Formation Under Constraint

Chapter 1 and 2 identified a critical gap: when FE mathematics teachers lack common pedagogical training yet develop shared professional understanding, how does this occur? Chapter 4 findings revealed three social mechanisms: narrative transmission (the 'accidental teacher' story circulates across institutions), discourse negotiation (collective redefinition of the role as 'confidence-building first'), and mentoring relationships as deliberate socialisation into existing professional discourse.

This extends Lave and Wenger's (1991) legitimate peripheral participation by specifying how it operates in contexts without formal training infrastructure. Professional communities facing similar conditions, diverse entry routes, inadequate formal preparation, institutional marginalisation, may similarly rely on these mechanisms to build shared identity from diverse backgrounds.

Contribution 2: Demonstrating How Professional Communities Negotiate Institutional Constraints Through Discourse

Chapter 4, RO2 findings revealed that teachers don't simply resist or comply with external accountability frameworks. Instead, they engage in ongoing institutional discourse negotiation where alternative quality standards ('lightbulb moments,' confidence transformation) coexist

with external metrics (Grade 4 achievement). This extends Holstein and Gubrium's (2008) concept by showing specifically how this negotiation operates in constrained contexts where teachers must simultaneously acknowledge institutional demands and maintain pedagogical commitment.

The finding that shared marginalisation narratives (mathematics as 'bolt-on') simultaneously validate individual experiences and justify pedagogical adaptations suggests that constraint can paradoxically strengthen professional community through shared discourse. This challenges Ball's (2003) performativity analysis by revealing collective sense-making as a mechanism for agency within constraint, not simply fragmentation or compliance.

Contribution 3: Specifying Social Learning Mechanisms for Pedagogical Expertise Development

Chapter 4, RO3 findings identified four specific circulation mechanisms through which pedagogical knowledge develops and spreads within professional communities with peer observation, collaborative planning, mentoring relationships, and cross-departmental partnerships. Rather than treating pedagogy as individual expertise, this reveals how sophisticated approaches (contextualisation, assessment innovation, differentiation) emerge through collective problem-solving and social transmission.

The finding that 'meet them where they are' functions as linguistic reification, condensing complex professional knowledge into a memorable phrase that circulates efficiently through communities and demonstrates how communities of practice create resources for transmitting sophisticated knowledge. This extends Wenger's (1998) concept of shared repertoire by identifying specific mechanisms through which linguistic resources develop and circulate.

Why These Contributions Matter:

Together, these findings advance theoretical understanding of professional learning in constrained contexts by demonstrating that communities of practice function differently when formal training is absent and institutional support is inadequate. Rather than requiring institutional infrastructure to function, professional communities under constraint may rely more heavily on narrative transmission, collective discourse negotiation, and structured mentoring to sustain themselves. This has implications for understanding professional learning in any sector where formal training proves inadequate or institutional support remains limited.

5.6 Limitations and Future Research

Chapter 3 established that this research employed semi-structured interviews analysed through social constructivist thematic analysis to investigate collective meaning-making processes. This section examines how methodological choices enabled investigation of professional communities while constraining certain insights, particularly regarding implications for generalisability and future research directions. The implementation of semi-structured interviews through digital platforms, necessitated by COVID-19 restrictions, presented both methodological opportunities and constraints that warrant careful consideration. While this adaptation enabled continued data collection, it introduced specific interpretative challenges, particularly regarding non-verbal communication and demonstration of physical teaching practices. The virtual research environment yielded unexpected methodological advantages. Digital platforms enhanced participant accessibility and engagement, while providing superior recording capabilities that facilitated precise transcription and analysis. The familiar environment of participants' chosen locations potentially encouraged more candid discourse regarding professional challenges, though this benefit must be weighed against the limitations of virtual interaction in capturing the full complexity of classroom dynamics.

Chapter 2, Section 2.5.5 established that Northeast England was selected as a 'critical case' (Flyvbjerg, 2006) rather than as representative sample. The region's post-industrial economic transition, dispersed geography, and resource constraints make visible the collective meaning-making processes central to this investigation. In regions with more institutional support or critical mass of mathematics teachers, professional communities might function differently, with formal training or institutional structures playing larger roles.

The sample of ten participants, while appropriate for depth investigation of professional communities, necessarily limits statistical generalisability. However, the variation across participant experience (3-25 years), career stage (early-career to experienced), and institutional type (FE colleges, sixth form colleges, specialist providers) enabled exploration of whether collective meanings vary across contexts or circulate sector-wide. Where shared language patterns appeared consistently across participants from different institutions (e.g., 'rebuilding confidence' across eight participants from different colleges), this provided stronger evidence of circulation through professional discourse rather than local context effects.

Several critical methodological considerations emerged during implementation. The single-interview design, while enabling detailed exploration of teaching experiences, potentially constrained opportunities for participant reflection and iterative insight development. Technical disruptions periodically affected interview coherence, requiring careful management to maintain

data quality. The coding process presented complex decisions regarding thematic categorisation, particularly when participant responses spanned multiple conceptual areas. The research's practical implications advance understanding of effective teaching practices within FE mathematics contexts, extending Swan's (2006) theoretical framework through documentation of adaptive pedagogical strategies within challenging institutional environments. These findings contribute to understanding professional development requirements, particularly regarding early career support, pedagogical innovation, and institutional positioning of mathematics education.

Future research should extend this investigation in three specific directions:

1. Longitudinal investigation of professional identity formation: This research documents that mentoring relationships transmit collective professional discourse to newcomers (Finding 1.3). Longitudinal studies tracking new teachers over 2-3 years could reveal whether mentoring systematically socialises teachers into existing professional communities or whether diverse entry routes produce competing professional meanings. This would test whether the shared 'accidental teacher' narrative represents genuine sector-wide discourse or locally-specific meaning-making. Chapter 4's Finding 1.1 documented this narrative's consistency, but longitudinal design could reveal whether it persists or shifts as professional communities evolve.

2. Investigation of institutional variation in collective meaning-making: This research examined nine FE institutions across Northeast England. Comparative investigation across different regional contexts, particularly regions with stronger institutional support structures or different industrial bases, could reveal whether the collective meaning-making mechanisms documented here (narrative transmission, discourse negotiation, mentoring relationships) operate differently when institutional constraints vary. This would extend the critical case logic by determining whether findings are Northeast-specific or reveal patterns relevant across constrained FE contexts.

3. Study of professional community boundaries: Chapter 4 documented that pedagogical knowledge circulates through peer observation, collaborative planning, and mentoring. Future research could investigate how knowledge circulates across institutional boundaries versus remaining contained within departments. Do vocational contextualisation strategies developed at one college diffuse across the sector? How do regional professional networks (Maths Hubs, CfEM) facilitate or constrain knowledge circulation compared to informal workplace discourse? This would extend RO3 findings by examining knowledge circulation mechanisms at different scales.

Investigation of cross-institutional collaboration might advance understanding of professional learning communities, addressing Hodgson and Spours' (2017) analysis of sector dynamics. Furthermore, examination of student perspectives could provide crucial complementary understanding to teacher experiences, aligning with Boaler's (2016) work on mathematical mindsets while extending to FE-specific contexts. These methodological insights suggest several enhancements for future research design: implementation of multiple-interview structures to enable deeper reflection; development of enhanced virtual data collection strategies; expansion of sampling to encompass more diverse teaching backgrounds; and integration of observational data alongside interview responses. Following Pring's (2015) argument, such research must maintain focus on education's broader purposes while addressing specific practical challenges in FE mathematics teaching. This methodological analysis contributes to what Smith (2017) identifies as crucial development needs in FE mathematics education, suggesting approaches that acknowledge both individual and systemic factors influencing teaching effectiveness. The research agenda proposed here recognises the complexity of FE mathematics education while suggesting systematic investigation methods to enhance teaching effectiveness and support what Coffield (2008) terms the reclamation of teaching and learning in FE settings.

The temporal positioning of this research during unprecedented educational disruption necessitates careful consideration of contextual factors that influenced both methodology and findings. The pandemic-induced transition to remote instruction revealed previously unexplored dimensions of mathematics pedagogy in FE settings. Participant narratives indicated fundamental shifts in pedagogical approaches, while simultaneously highlighting the adaptability of teaching practices within constrained circumstances. Initial Teacher Training (ITT) implications emerged as a significant consideration, particularly regarding the disconnect between theoretical preparation and practical challenges within FE mathematics education. The findings reveal systematic gaps between training provision and classroom realities, especially concerning the management of diverse mathematical histories within GCSE resit contexts. This disjunction suggests the need for enhanced alignment between ITT frameworks and the specific demands of FE mathematics teaching.

The implementation of educational policy presents persistent challenges regarding the relationship between theoretical frameworks and practical application. Participant experiences revealed systematic tensions between policy directives and institutional capacity, particularly concerning resource allocation and implementation timelines. This misalignment reflects broader issues in policy development processes, specifically the limited integration of practitioner perspectives in reform initiatives.

Researcher positionality, encompassing dual roles as former Head of Mathematics and current Initial Teacher Trainer, required careful methodological consideration. While this positioning enhanced interpretative capacity through experiential understanding, it necessitated systematic attention to potential bias in both data collection and analysis. This duality provided unique insights while demanding rigorous attention to maintaining analytical objectivity.

These contextual considerations suggest the necessity for comprehensive reform approaches that acknowledge both systemic constraints and pedagogical aspirations within FE mathematics education. The research indicates that meaningful enhancement requires sustained attention to professional development frameworks while addressing institutional barriers to effective practice implementation.

5.7 Implementation Framework and Strategic Recommendations

This research necessitates a systematic implementation framework addressing both immediate pedagogical requirements and sustained institutional transformation within FE mathematics education. Following Hodgson and Spours' (2017) analysis of sector dynamics, this framework incorporates multi-tiered temporal approaches while maintaining sensitivity to institutional constraints.

Immediate interventions (0-6 months): Systematise mentoring as primary professional development mechanism

Finding 1.3 documented that eight of ten participants attributed professional development to mentoring relationships specifically, reporting greater impact from mentoring than formal training. Finding 3.1 revealed that pedagogical approaches circulate through mentoring relationships. Therefore, institutions should:

- Establish structured mentoring requiring: (a) explicit focus on transmitting collective professional discourse ('rebuilding confidence first,' 'meet them where they are'), not just individual skill development; (b) protected time for observation and reflection; (c) collaborative planning where experienced teachers deliberately expose newcomers to professional meaning-making processes
- Create explicit mentoring protocols ensuring transmission of shared narratives and professional language identified in Chapter 4
- Resource mentoring as primary professional development infrastructure rather than supplementary activity

This systematises the mechanism already identified in findings as most effective.

Medium-term developments (6-18 months): Establish systematic knowledge circulation mechanisms across institutions

Findings 3.1-3.4 revealed that pedagogical approaches develop through workplace participation and circulate through specific mechanisms: peer observation, collaborative planning, mentoring, cross-departmental partnerships. Chapter 4 also documented that teachers use shared language patterns ('rebuilding confidence,' 'meet them where they are') suggesting sector-wide circulation. Therefore:

- Establish formal peer observation networks where teachers from different institutions systematically observe and reflect on each other's practice, targeting transfer of contextualisation strategies (Finding 3.2) and assessment innovation (Finding 3.3)
- Create cross-institutional collaborative planning groups focused on developing pedagogical responses to specific challenges (mathematical anxiety, learner identity formation) where professionals collectively solve problems
- Develop documentation of shared professional discourse and pedagogical approaches identified in Chapter 4 (the 'meet them where they are' framework, alternative success measures, assessment for learning adaptations) to facilitate deliberate transmission across institutions
- Support regional mathematics professional learning communities that facilitate knowledge circulation beyond individual institutions

This creates infrastructure around the social learning mechanisms documented in Chapter 4.

Long-term transformation (18+ months): Establish infrastructure supporting institutional discourse negotiation about professional standards

Chapter 4, RO2 findings revealed that teachers collectively construct alternative quality standards (lightbulb moments, confidence improvement, mathematical resilience) through institutional discourse negotiation. These alternatives remain largely invisible within external accountability frameworks. Long-term transformation requires:

- Regional Mathematics Pedagogy Centers with three specific functions: (1) documenting professionally-constructed quality standards and alternative success measures identified by teachers; (2) facilitating institutional dialogue about how to balance external accountability

requirements with professional judgment; (3) developing evidence about impact of alternative approaches on sustained student outcomes

- Sustained funding for cross-institutional collaborative networks where teachers collectively define professional excellence and develop shared pedagogical responses
- Research partnerships with HE institutions studying how professional communities negotiate institutional constraints, extending this investigation's findings

This positions professional communities as legitimate sources of professional knowledge rather than simply recipients of external mandates.

Implementation accountability necessitates precise allocation of responsibilities across stakeholder groups. Institutional leadership bears responsibility for resource allocation and organisational restructuring, while departmental management oversees mentoring programme implementation. Teaching staff engage in collaborative development initiatives, supported by policy makers' commitment to assessment reform and funding model development.

Progress evaluation requires systematic monitoring against established benchmarks, incorporating both quantitative metrics and qualitative evidence of enhanced pedagogical effectiveness. This evaluation promotes what Mason (2018) terms 'methodological consciousness' in assessing implementation impact. The framework maintains sufficient flexibility to respond to emerging requirements while preserving focus on core objectives for mathematics teaching enhancement in FE contexts.

5.8 Elevating the Status of FE Mathematics Teaching

Finding 2.3 in Chapter 4 documented that nine of ten participants independently used near-identical metaphors to describe institutional marginalisation ('bolt-on,' 'add-on,' 'afterthought,' 'lip service'). The consistency across different institutions suggests circulation of shared narrative about mathematics' institutional positioning rather than isolated experience. This shared narrative serves important functions within professional communities, it validates individual experiences, creates collective identity, and justifies pedagogical adaptations. However, the research also reveals that this marginalisation has material consequences for teaching effectiveness, participants described how inadequate resourcing, unfavourable timetabling, and lack of departmental priority directly constrained pedagogical possibilities.

Addressing institutional marginalisation requires understanding that this is not simply an attitudinal problem but reflects systematic resource allocation decisions reflecting what Ball et

al. (2012) term 'field positioning.' Mathematics is positioned as compliance provision (required by policy but devalued in institutional priorities) rather than core provision generating institutional investment

This positioning of mathematics within FE settings reflects what the literature terms the '*beleaguered*' status of the subject, as identified by Dalby and Noyes (2016). The findings suggest that this peripheral status manifests through a range of institutional practices, including inadequate resource allocation, unfavourable timetabling arrangements, and a general lack of parity with vocational programmes.

Elevating the status and recognition of mathematics teaching within FE institutions emerges as a critical area for transformation. Participant narratives indicate that this devaluation not only undermines the effectiveness of mathematics instruction but also negatively impacts teacher morale, professional identity, and long-term retention in the sector.

Addressing institutional marginalisation requires three interconnected changes grounded in specific findings:

1. Structural reallocation based on pedagogical requirements: Finding 2.3 revealed that resource constraints directly impact pedagogical effectiveness. Classroom space, technology, marking time, and professional development funding are systematically allocated to vocational areas with higher institutional funding returns. Elevating mathematics status requires reallocation decisions recognising that mathematics teaching's unique challenges, addressing mathematical anxiety (65% of apprentices report moderate-to-high anxiety per Johnston-Wilder et al., 2016), rebuilding confidence from repeated failure, managing extreme ability ranges, create particular resource intensiveness. Rather than arguing mathematics deserves resources because it matters, institutional leaders should understand it requires resources because the pedagogical work required is more intensive than initial teaching.

2. Infrastructure supporting collective professional meaning-making: Finding 1.3 revealed mentoring relationships as primary professional development; RO3 findings revealed peer observation and collaborative planning as essential. Institutions elevating mathematics status should resource these social learning mechanisms, protected time for observation, collaborative planning, mentoring relationships, as core mathematics departmental infrastructure, not supplementary activities squeezed around teaching loads.

3. Reconceptualising mathematics from 'remediation' to 'essential skill development': The research findings consistently reveal teachers redefining their role from 'teaching failed learners'

to 'rebuilding confidence and developing mathematical resilience.' This redefinition should be explicitly supported institutionally. Rather than framing FE mathematics as remediation or compliance provision, institutional discourse should position it as essential work addressing complex pedagogical challenges requiring sophisticated professional expertise.

Transforming the cultural positioning of mathematics is perhaps an even more pressing concern. Participants highlighted the pervasive societal view of mathematics as a difficult, irrelevant, or *'geeky'* subject, which perpetuates negative attitudes and low expectations among both students and educators. Challenging these deep-seated perceptions will require proactive, large-scale efforts to reframe the public perception of mathematics and its vital role in individual and societal development.

5.9 Concluding Reflections

This investigation marks a significant point in the researcher's professional journey. The research emerged from a specific positioning as a practitioner with twenty years of FE teaching experience resulting in leading a maths department, now responsible for preparing the next generation of FE mathematics teachers, seeking to understand the professional processes they had experienced implicitly. The research has completed a circle. Twenty years of FE practice provided experiential knowledge of how professional communities' function. Conducting this research as a scholar provided theoretical frameworks and empirical evidence for what was previously known implicitly. Now, as a PGCE Programme Leader, the researcher is positioned to translate these understandings into systemic changes in how teachers are prepared for professional contexts where expertise will develop through community participation. This is not a transformation from ignorance to knowledge. Rather, it is a transformation from implicit to explicit knowledge, from experiential to theoretical understanding, from practitioner wisdom to research evidence that can justify systemic change. The researcher's role has evolved from facilitating professional processes implicitly (as a Head of Mathematics) to implementing them systematically and intentionally (as a PGCE Programme Leader informed by research). The most significant implication of this research is not primarily about policy reform or institutional change, though these are important. It is about what the researcher will now do, differently and intentionally, in their own professional practice. The research has transformed the researcher from a practitioner who knew implicitly how professional communities function to a teacher educator who can now systematically prepare trainees for participation in those communities.

This investigation examined a fundamental question: *How do FE mathematics teachers collectively construct their professional identity and practice through institutional discourse and*

community participation? Through analysis of interviews with ten teachers across Northeast England, using a theoretical framework combining Wenger's (1998) communities of practice with Holstein and Gubrium's (2008) institutional discourse analysis, the research revealed that professional expertise in FE mathematics teaching is fundamentally social, emerging through workplace conversations, mentoring relationships, and participation in communities of practice rather than through formal training or individual reflection.

The specific findings suggest directions for systemic reform. These findings indicate that professional development might more effectively support expertise development through the social mechanisms teachers already employ—mentoring relationships, peer observation, collaborative planning, and cross-departmental partnerships—rather than assuming knowledge flows from formal training to individual practitioners. The research reveals teachers have collectively negotiated alternative quality standards that extend beyond Grade 4 achievement metrics; policymakers might engage with these professionally-constructed indicators rather than imposing external frameworks. Addressing institutional marginalisation of mathematics may require attention to structural positioning and resource allocation decisions rather than treating this as an attitudinal problem.

When policy mandates covering 50 topics in 30 weeks (Chapters 1-2 context) yet institutional reality reveals many learners need weeks of confidence-building before mathematical instruction becomes possible, the gap reflects not teacher inadequacy but policy unrealism. The research reveals that teachers have already collectively negotiated how to balance policy requirements with pedagogical reality, suggesting that effective reform might build on and support these existing meaning-making processes rather than introducing further top-down mandates.

Professional development implications suggest integrated approaches that acknowledge the complexity of mathematics teaching within FE contexts. Following Lave and Wenger's (1991) conception of legitimate peripheral participation, findings indicate that sustained professional learning communities, supported through structured mentoring relationships and cross-institutional collaboration, could address FE-specific challenges in teacher recruitment and retention. Enhanced early-career support structures that acknowledge both pedagogical development requirements and institutional constraints may prove particularly valuable.

The findings indicate potential implications for policy across three domains. Assessment frameworks might be reconsidered in light of Biesta's (2010) critique of measurement-focused education, potentially balancing examination requirements with conceptual understanding

development. Resource allocation mechanisms could be examined to support sustained professional development while acknowledging institutional constraints. Accountability measures might be reformed to incorporate Mason's (2018) framework regarding methodological consciousness in educational evaluation.

As detailed in Section 5.6, future research directions include longitudinal investigation of professional identity formation, comparative analysis across regional contexts, and examination of professional community boundaries. These investigations could extend understanding of how collective meaning-making operates across varied institutional conditions.

The findings align with Smith (2017) regarding the need for coordinated reform initiatives addressing both individual teacher development and systemic transformation. These initiatives might consider how mathematics education is positioned and resourced within FE settings, potentially enabling integrated approaches to teaching enhancement that serve both learner needs and broader societal development aims.

This research advances understanding of mathematics teaching within Further Education through systematic examination of teacher experiences in Northeast England. The findings demonstrate both persistent challenges and innovative responses in FE mathematics education, suggesting pathways toward enhanced practice through coordinated reform.

This investigation reveals that when FE mathematics teachers work within conditions of institutional constraint, inadequate formal training, and contested external accountability, they collectively construct professional knowledge through specific social mechanisms: shared narrative transmission, institutional discourse negotiation, and structured mentoring relationships.

Three core implications follow:

1. **Professional development reform should systematize social learning mechanisms.** The research reveals that mentoring, peer observation, and collaborative planning are not supplementary to training but primary mechanisms through which expertise develops. Reform should resource these as core infrastructure rather than marginal activities.
2. **Accountability frameworks should engage with professionally-constructed quality standards.** The research reveals teachers have already collectively negotiated alternative success measures that better capture their work. Rather than imposing new frameworks, policy should recognize professional meaning-making processes and create mechanisms for engaging with teacher-constructed quality indicators.

3. **Institutional positioning of mathematics should reflect pedagogical realities.** The research reveals that mathematical anxiety, trauma from repeated failure, and confidence-building are not individual teacher concerns but systematic pedagogical challenges affecting 65% of learners (Johnston-Wilder et al., 2016). Elevating mathematics status within institutions requires resource allocation reflecting these realities.

The researcher, positioned as both a former FE practitioner and current PGCE Programme Leader, recognises that the findings of this investigation demand not just policy recommendations or institutional advice. They demand transformation of the researcher's own professional practice. The research has revealed that initial teacher education's primary responsibility is not to create expert teachers but to prepare novice participants for professional communities where expertise will develop through years of workplace engagement, collective problem-solving, and participation in communities of practice. This understanding now directs how the researcher will structure mentoring partnerships, sequence curriculum content, position trainees in professional communities, and assess professional development. This is the profound implication of this research, not just for policy, not just for institutions, but for the researcher themselves as a professional responsible for preparing teachers. The research has transformed theory into practice, implicit knowledge into explicit action, personal experience into professional responsibility. The researcher's PGCE programme will be different as a result. And this transformation of the researcher's own practice is the truest test of this investigation's significance.

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References

- Association of Colleges (2023) College key facts 2022/23. London: AoC.
- Ball, D.L., Thames, M.H. and Phelps, G. (2008) 'Content knowledge for teaching: What makes it special?', Journal of Teacher Education, 59(5), pp. 389-407.
- Ball, S.J. (2003) 'The teacher's soul and the terrors of performativity', Journal of Education Policy, 18(2), pp. 215-228.
- Ball, S.J., Maguire, M. and Braun, A. (2012) How schools do policy: policy enactments in secondary schools. Abingdon: Routledge.
- Barton, C. (2018) How I Wish I'd Taught Maths. Woodbridge: John Catt Educational.
- Bathmaker, A.M. (2013) 'Defining 'knowledge' in vocational education qualifications in England: an analysis of key stakeholders and their constructions of knowledge, purposes and content', Journal of Vocational Education & Training, 65(1), pp. 87-107.
- Bathmaker, A.M. (2019) Teaching and learning in FE: Advancing critical practice. Journal of Vocational Education and Training, 71(3), 351-368.
- Beetham, H. and Sharpe, R. (2013) Rethinking Pedagogy for a Digital Age: Designing for 21st Century Learning. 2nd edn. London: Routledge.
- Beijaard, D., Meijer, P.C. and Verloop, N. (2004) 'Reconsidering research on teachers' professional identity', Teaching and Teacher Education, 20(2), pp. 107-128.
- Belgutay, J. and Martin, W. (2016, May 27) 'Surge in GCSE retakes sparks recruitment crisis', TES (Times Educational Supplement).
- BERA (British Educational Research Association) (2024) Ethical guidelines for educational research. https://www.bera.ac.uk/
- Berger, P.L. and Luckmann, T. (1966) The Social Construction of Reality: A Treatise in the Sociology of Knowledge. Garden City, NY: Anchor Books.
- Biesta, G. (2010) Good education in an age of measurement: ethics, politics, democracy. Boulder, CO: Paradigm Publishers.
- Black, P. and Wiliam, D. (1998) 'Assessment and classroom learning', Assessment in Education: Principles, Policy & Practice, 5(1), pp. 7-74.
- Boaler, J. (2015) Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching. San Francisco: Jossey-Bass.
- Boaler, J. (2016) Mathematical Mindsets. San Francisco: Jossey-Bass.
- Boaler, J., Wiliam, D. and Brown, M. (2011) 'Students' experiences of ability stratification in schools in England and the United States', Research in Mathematics Education, 13(2), pp. 129-144.
- Borg, S. (2015) Teacher Cognition and Language Education: Research and Practice. London: Bloomsbury Academic.
- Bourdieu, P. (1977) Outline of a theory of practice. Cambridge University Press.
- Bourdieu, P. (1990) The logic of practice. Polity Press.
- Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', Qualitative Research in Psychology, 3(2), pp. 77-101.
- Braun, V. and Clarke, V. (2019) 'Reflecting on reflexive thematic analysis', Qualitative Research in Sport, Exercise and Health, 11(4), pp. 589-597.

- Brinkmann, S. and Kvale, S. (2015) InterViews: Learning the craft of qualitative research interviewing (3rd ed.). Sage Publications.
- Bronfenbrenner, U. (1979) The ecology of human development: Experiments by nature and design. Harvard University Press.
- Bryman, A. (2016) Social research methods (5th ed.). Oxford University Press.
- Casey, R., Cara, O., Eldred, J., Grief, S., Hodge, R., Ivanic, R., Jupp, T., Lopez, D. and McNeil, B. (2006) '"You wouldn't expect a maths teacher to teach plastering...": embedding literacy, language and numeracy in post-16 vocational programmes - the impact on learning and achievement'. London: NRDC.
- CfEM (Centre for Excellence in Mathematics) (2022) Synthesis of collaborative mathematics teaching practices in Further Education. [Internal sector report].
- Christodoulou, D. (2017) Making Good Progress?: The Future of Assessment for Learning. Oxford: Oxford University Press.
- Coffield, F. (2008) Just Suppose Teaching and Learning Became the First Priority.... London: Learning and Skills Network.
- Coffield, F., Edward, S. and Finlay, I. (2014) 'It's the little things': Exploring Further Education teachers' professionalism. Research in Post-Compulsory Education, 19(3), 233-247.
- Cohen, L., Manion, L. and Morrison, K. (2018) Research methods in education (8th ed.). Routledge.
- Crawley, J. (2016) In good practice in practitioner research in Further Education. Journal of Vocational Education and Training, 68(1), 42-58.
- Creswell, J.W. and Poth, C.N. (2018) Qualitative inquiry and research design: choosing among five approaches. 4th edn. London: Sage Publications Ltd.
- Crotty, M. (1998) The Foundations of Social Research: Meaning and Perspective in the Research Process. London: SAGE.
- Dalby, D. (2013) 'An alternative destination for post-16 mathematics: views from the perspective of vocational students', in Smith, C. (ed.) Proceedings of the British Society for Research into Learning Mathematics, 33(3), pp. 13-18.
- Dalby, D. and Noyes, A. (2015) 'Connecting Mathematics Teaching with Vocational Learning', Adults Learning Mathematics: An International Journal, 10(1), pp. 40-49.
- Dalby, D. and Noyes, A. (2016) 'Locating mathematics within post-16 vocational education in England', Journal of Vocational Education & Training, 68(1), pp. 70-86.
- Dalby, D. and Noyes, A. (2016) Mathematics education and the FE landscape. Journal of Further and Higher Education, 40(6), 723-740.
- Dalby, D. and Noyes, A. (2018) 'Mathematics education policy enactment in England's Further Education colleges', Journal of Vocational Education & Training, 70(4), pp. 564-580.
- Daley, M., Orr, K. and Petrie, J. (2015) Further Education and the Twelve Dancing Princesses. London: Institute of Education Press.
- Davies, P. (2020) Accountability in education: Pressures and perceptions in UK colleges. European Journal of Education, 55(3), 412-429.
- Denscombe, M. (2014) The Good Research Guide: For Small-Scale Social Research Projects. 5th edn. Maidenhead: Open University Press.

- Dennis, R. (2016) Practitioner research in educational contexts: Ethical considerations. Educational Research Review, 17, 20-31.
- Department for Education (2017) Post-16 Skills Plan. London: DfE.
- Department for Education (2019) Core Content Framework. London: DfE.
- Department for Education (2021a) Mathematics Teaching for Mastery: National Support. London: DfE.
- Department for Education (2021b) Initial Teacher Training Core Content Framework. London: DfE.
- Department for Education (2022) Skills for Jobs: Lifelong Learning for Opportunity and Growth. London: DfE.
- Diamond, J. (2020, February 7) 'Dangle the HE carrot to inspire your resit students', The Times Educational Supplement. ProQuest Global Newsstream Collection.
- Drake, P. and Heath, L. (2011) Practitioner research at doctoral level: Developing practice through research. Routledge.
- Drury, H. (2018) How to Teach Mathematics for Mastery. Oxford: Oxford University Press.
- Drury, H. (2021) 'Professional development needs of Further Education mathematics teachers', Research in Mathematics Education, 23(1), pp. 25-42.
- Duckworth, V. (2013) Learning Trajectories, Violence and Empowerment amongst Adult Basic Skills Learners. London: Routledge.
- Duckworth, V. and Maxwell, B. (2015) Summative assessment practices in Further Education: Teachers' perceptions and practices. Journal of Vocational Education and Training, 67(2), 257-272.
- Duckworth, V. and Smith, R. (2018) Responding to educational disadvantage: Insights from practitioner research. Research in Post-Compulsory Education, 23(4), 498-516.
- Dwyer, S.C. and Buckle, J.L. (2009) 'The space between: On being an insider-outsider in qualitative research', International Journal of Qualitative Methods, 8(1), pp. 54-63.
- Education & Training Foundation (2014) Effective Practices in Post-16 Vocational Maths: Final Report. London: Education & Training Foundation.
- Education & Training Foundation (2022) Changing the experience of FE maths: CFEM final report - synthesis of action research reports 2021/22. Education & Training Foundation.
- Engeström, Y. (2001) Expansive learning at work: Toward an activity theoretical reconceptualization. Journal of Education and Work, 14(1), 133-156.
- ETF (Education and Training Foundation) (2014) Collaborative innovations in Further Education: Synthesis across 51 institutions. ETF Publications.
- Evans, J. (2000) Adults' Mathematical Thinking and Emotions: A Study of Numerate Practices. London: RoutledgeFalmer.
- Evetts, J. (2009) 'New professionalism and professionalism within organisations: challenges and changes', Comparative Sociology, 8(2), pp. 176-199.
- Finlay, L. (2002) Negotiating the swamp: The opportunity and challenge of reflexive research. Qualitative Research, 2(2), 209-230.

- Flyvbjerg, B. (2006) 'Five misunderstandings about case-study research', Qualitative Inquiry, 12(2), pp. 219-245.
- Foster, C. (2013) 'Mathematical études: Embedding opportunities for developing procedural fluency within rich mathematical contexts', International Journal of Mathematical Education in Science and Technology, 44(5), pp. 765-774.
- Gadamer, H.G. (1975) Truth and method (2nd ed.). Seabury Press.
- Geertz, C. (1973) The Interpretation of Cultures. New York: Basic Books.
- Gleeson, D. and James, D. (2007) 'The paradox of professionalism in English further education: a TLC project perspective', Educational Review, 59(4), pp. 451-467.
- Gleeson, D., Davies, J. and Wheeler, E. (2015) The changing role of the FE college in the English education and training landscape. Journal of Education Policy, 20(5), 627-642.
- Greatbatch, D. and Tate, S. (2018) Teaching, Leadership and Governance in Further Education. London: Department for Education.
- Grix, S. (2014, November 14) 'Do bricklayers really need GCSE maths?', The Times Educational Supplement, 5121. ProQuest Global Newsstream Collection.
- Hammersley, M. (2006) 'Ethnography: problems and prospects', Ethnography and Education, 1(1), pp. 3-16.
- Hammersley, M. (2006) Ethnography and discourse analysis: Complementary or competing approaches? Discourse & Society, 17(4), 515-525.
- Hammersley, M. (2017) Qualitative research: A pragmatic approach. Sage Publications.
- Hammersley, M. and Traianou, A. (2012) Ethics and educational research (2nd ed.). British Educational Research Association.
- Harrison, P. and Chen, L. (2023) 'Post-pandemic mathematics anxiety in Further Education', Journal of Further and Higher Education, 47(3), pp. 278-293.
- Henderson, D. (2023) 'Post-Brexit funding challenges for further education', FE Week, 15 March.
- Herr, K. and Anderson, G.L. (2014) The action research dissertation: A guide for students and faculty (2nd ed.). Sage Publications.
- Hodgen, J. and Marks, R. (2013) 'The Employment Equation: Why our young people need more maths for today's jobs'. London: The Sutton Trust.
- Hodgen, J., Foster, C., Marks, R. and Brown, M. (2010) 'Improving Key Stage 3 mathematics: research on the impact of a continuing professional development programme', Research in Mathematics Education, 12(2), pp. 161-162.
- Hodgen, J., Foster, C., Marks, R. and Brown, M. (2018) 'Improving mathematics in key stages two and three: Evidence review'. London: Education Endowment Foundation.
- Hodgen, J., Marks, R. and Pepper, D. (2017) 'Towards universal participation in post-16 mathematics: lessons from high-performing countries', Oxford Review of Education, 43(2), pp. 162-176.
- Hodgson, A. and Spours, K. (2017) The further education and training system in England: Roles, responsibilities and relationships. Institute of Education Publications.

- Hodkinson, P. and Hodkinson, H. (2011) The influence of place, autonomy and agency in career-change decision-making: Narratives of three teachers. The Curriculum Journal, 22(2), 189-209.
- Holstein, J.A. and Gubrium, J.F. (2008) Constructionist perspectives on life work. London: Sage Publications Ltd.
- Holstein, J.A. and Gubrium, J.F. (2008) 'Constructionist impulses in ethnographic fieldwork', in Holstein, J.A. and Gubrium, J.F. (eds.) Handbook of Constructionist Research. New York: Guilford Press, pp. 373-395.
- Holstein, J.A. and Gubrium, J.F. (2016) 'Animating interview narratives', in Silverman, D. (ed.) Qualitative Research. 4th edn. London: Sage Publications Ltd, pp. 149-167.
- Holstein, J.A. and Gubrium, J.F. (2016) Animated interviewing: Qualitative research and social interaction. Sage Publications.
- Horrocks, N., White, P. and Roberts, S. (2012) Practitioner research in post-compulsory education: Critical reflections on method and purpose. Research in Post-Compulsory Education, 17(4), 541-558.
- Hoyles, C. (2018) 'Transforming the mathematical practices of learners and teachers through digital technology', Research in Mathematics Education, 20(3), pp. 209-228.
- Hoyles, C., Noss, R., Kent, P. and Bakker, A. (2010) 'Improving mathematics at work: The need for techno-mathematical literacies'. London: Routledge.
- Jameson, J. and Fusco, J. (2014) 'Student outcomes and experiences on level 2 mathematics courses in further education', Research in Post-Compulsory Education, 19(1), pp. 109-127.
- Johnston-Wilder, S., Brindley, J. and Dent, P. (2016) 'Mathematical anxiety in post-compulsory education: learners' stories', in Booth, D. and Ker, B. (eds.) Transitions and trajectories for literacy, language and numeracy. Routledge, pp. 38-54.
- Johnston-Wilder, S. and Lee, C. (2010) 'Mathematical resilience', Mathematics Teaching, 218, pp. 38-41.
- Johnston-Wilder, S. and Lee, C. (2022) 'Mathematical resilience in post-pandemic contexts', International Journal of Mathematical Education in Science and Technology, 53(2), pp. 234-249.
- Johnston-Wilder, S., Pardoe, S., Almehrz, H., Evans, B., Marsh, J. and Richards, S. (2016) 'Developing teaching for mathematical resilience in further education', in ICERI2016 Proceedings (pp. 3019-3028). 9th International Conference of Education, Research and Innovation, Seville, Spain.
- Kay, J. (2020, April 3) 'GCSE resits: how to keep your class on track', The Times Educational Supplement. ProQuest Global Newsstream Collection.
- Knowles, M.S. (1984) Andragogy in Action. San Francisco: Jossey-Bass.
- Knowles, M.S., Holton, E.F. and Swanson, R.A. (2015) The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development. 8th edn. London: Routledge.
- Kvale, S. and Brinkmann, S. (2009) InterViews: Learning the craft of qualitative research interviewing (2nd ed.). Sage Publications.

- Kvale, S. and Brinkmann, S. (2015) InterViews: Learning the craft of qualitative research interviewing (3rd ed.). Sage Publications.
- Lave, J. and Wenger, E. (1991) Situated learning: legitimate peripheral participation. Cambridge: Cambridge University Press.
- Lincoln, Y.S. and Guba, E.G. (1985) Naturalistic inquiry. Sage Publications.
- Lucas, B. and Claxton, G. (2010) New Kinds of Smart: How the Science of Learnable Intelligence is Changing Education. Maidenhead: Open University Press.
- Lucas, B., Spencer, E. and Claxton, G. (2012) How to Teach Vocational Education: A Theory of Vocational Pedagogy. London: City & Guilds Centre for Skills Development.
- Luckin, R., Bligh, B., Manches, A., Ainsworth, S., Crook, C. and Noss, R. (2012) Decoding Learning: The Proof, Promise and Potential of Digital Education. London: Nesta.
- Lupton, R., Benton, T. and Pye, J. (2019) Inequality in key worker occupations and geographical inequality in England. London: Institute of Education, University College London.
- Mason, J. (2018) Qualitative researching (3rd ed.). Sage Publications.
- Mason, M. (2018) 'Complexity theory and the philosophy of education', Educational Philosophy and Theory, 50(4), pp. 368-377.
- McCrea, E. (2020) Motivated Teaching. Carmarthen: Crown House Publishing.
- Mercer, N. and Sams, C. (2006) 'Teaching children how to use language to solve maths problems', Language and Education, 20(6), pp. 507-528.
- Merriam, S.B. and Tisdell, E.J. (2016) Qualitative research: A guide to design and implementation (4th ed.). Jossey-Bass.
- National Education Union (2020) State of Education: Workload. London: NEU.
- Northeast Local Enterprise Partnership (2019) Strategic Economic Plan: Delivering growth and opportunity. Newcastle upon Tyne: NELEP.
- Norton, A. (2019) Policy, governance and the FE sector: Changing landscape. Journal of Further and Higher Education, 43(6), 738-751.
- Norris, E. (2023) 'GCSE or Functional Skills? Understanding student perceptions of mathematics qualifications in further education', Research in Post-Compulsory Education, 28(1), pp. 45-67.
- Noyes, A. (2007) Rethinking School Mathematics. London: Paul Chapman Publishing.
- Noyes, A., Sealey, P. and Higson, H. (2017) Contextual factors influencing teaching and learning in advanced level mathematics. The Curriculum Journal, 28(1), 115-134.
- Noyes, A., Wake, G., Drake, P. and Meyer, R. (2021) Mathematics education and the FE sector: Challenges and opportunities. Research in Mathematics Education, 23(2), 134-152.
- Noyes, A. and Dalby, D. (2020) Mathematics in England's Further Education Colleges: An analysis of policy enactment and practice. The Mathematics in Further Education Colleges Project: Interim report 2 (Executive Summary). University of Nottingham: Nuffield Foundation.
- Nixon, L. and Cooper, J.B. (2020) 'Less but Better? Teaching Maths in Further Education and Collateral Growth', Education Sciences, 10(3), 61. https://doi.org/10.3390/educsci10030061

- OECD (2023) Education Policy Reform: Learning from International Experience. Paris: OECD Publishing.
- OECD (2024) Education at a Glance 2024: OECD Indicators. Paris: OECD Publishing.
- Office for National Statistics (2023) Labour market overview, UK: December 2023. London: ONS.
- O'Leary, M. and Smith, R. (2019) Culturally responsive teaching in Further Education: Insights from practitioner research. Teaching and Teacher Education, 82, 157-166.
- O'Leary, M. and Wood, P. (2017) 'Reimagining teacher education: lessons from the Teaching and Learning Research Programme', British Educational Research Journal, 43(1), pp. 112-129.
- Parr, C. (2021, March 12) 'A post-pandemic GCSE resits explosion is coming', The Times Educational Supplement. ProQuest Global Newsstream Collection.
- Patton, M.Q. (2015) Qualitative research and evaluation methods (4th ed.). Sage Publications.
- Pratt, N. (2012) 'Mathematics teaching in an era of high-stakes testing', in Thompson, I. (ed.) Issues in Teaching Numeracy in Primary Schools. 2nd edn. Maidenhead: Open University Press, pp. 205-216.
- Priestley, M., Biesta, G.J.J. and Robinson, S. (2015) Teacher Agency: An Ecological Approach. London: Bloomsbury Academic.
- Pring, R. (2015) Philosophy of Educational Research. 3rd edn. London: Bloomsbury Academic.
- Pro Bono Economics (2022) The Economic Cost of Poor Numeracy Skills. London: Pro Bono Economics.
- Rapley, T.J. (2001) The art(fulness) of open-ended interviewing: Some considerations on analysing interviews. Qualitative Research, 1(3), 303-323.
- Ravitch, S.M. and Carl, N.M. (2020) Qualitative research: Bridging the conceptual, theoretical, and practical (2nd ed.). Sage Publications.
- Robson, J., Bailey, B. and Larkin, S. (2004) 'Adding value: investigating the discourse of professionalism adopted by vocational teachers in further education colleges', Journal of Education and Work, 17(2), pp. 183-195.
- Schon, D.A. (1991) The reflective practitioner: How professionals think in action (Revised ed.). Basic Books.
- Schutz, A. (1967) The phenomenology of the social world. Northwestern University Press.
- Sherrington, T. (2017) The Learning Rainforest: Great Teaching in Real Classrooms. Woodbridge: John Catt Educational.
- Sherwood, S. (2019) 'Teaching mathematics in further education: The importance of subject knowledge', Research in Post-Compulsory Education, 24(1), pp. 23-41.
- Shulman, L.S. (1986) 'Those who understand: Knowledge growth in teaching', Educational Researcher, 15(2), pp. 4-14.
- Shulman, L.S. (1987) 'Knowledge and teaching: Foundations of the new reform', Harvard Educational Review, 57(1), pp. 1-22.

- Silverman, D. (2017) Doing qualitative research (5th ed.). Sage Publications.
- Smith, A. (2017) 'Making mathematics count: the case for change in post-16 mathematics', Mathematics Today, 53(2), pp. 80-87.
- Smith, R., Golding, S. (2019) Professional identity in FE teaching: Challenges and opportunities. Research in Post-Compulsory Education, 24(2), 188-204.
- Smith, R. and O'Leary, M. (2015) The multilayered nature of FE teaching practice. Journal of Vocational Education and Training, 67(2), 167-183.
- Smith, R., Saunders, M., Coffield, F. and Spours, K. (2009) The context and purpose of practitioners' engagement with research. Journal of Further and Higher Education, 33(1), 51-65.
- Solomon, Y. (2012) 'Finding a voice? Narrating the female self in mathematics', Educational Studies in Mathematics, 80(1-2), pp. 171-183.
- Stake, R.E. (2010) Qualitative research: Studying how things work. The Guilford Press.
- Stenhouse, L. (1975) An introduction to curriculum research and development. Heinemann.
- Swain, J. (2005) 'Changes to adult learners' identities through learning numeracy', Literacy and Numeracy Studies, 14(1), 5-16.
- Swain, J., Baker, E., Holder, D., Newmarch, B. and Coben, D. (2005) '"Beyond the daily application": making numeracy teaching meaningful to adult learners'. London: NRDC.
- Swan, M. (2006) Collaborative Learning in Mathematics: A Challenge to our Beliefs and Practices. London: National Research and Development Centre for Adult Literacy and Numeracy.
- Swan, M. (2006) The emerging significance of mathematical thinking: The complexities of practice. In L. Verschaffel, F. Dochy, M. Boekaerts, & S. Vosniadou (Eds.), Instructional psychology: Past, present, and future (pp. 189-206). Elsevier.
- Technical and Further Education Act (2017) c.19. London: HMSO.
- Thompson, D.R. and Hatfield, N.J. (2019) 'Recruitment and retention of early career secondary mathematics teachers', Journal for Research in Mathematics Education, 50(2), pp. 113-120.
- Thompson, S. (2018) The compressed nature of FE teaching. Research in Education, 100, 78-95.
- Tomlinson, C.A. (2014) The Differentiated Classroom: Responding to the Needs of All Learners. 2nd edn. Alexandria, VA: ASCD.
- Topping, K., Campbell, J., Douglas, W. and Smith, A. (2017) 'Cross-age peer tutoring in mathematics with 7-8 year olds: Influence on mathematical vocabulary, strategic dialogue and self-concept', Educational Research, 45(3), pp. 287-308.

The Good, The Bad and The Ugly of Teaching Maths in Further Education.

Appendices

Wondershare PDFelement

University of Sunderland

Application 016745

Section A: Applicant details

Date application started:
Tue 21 February 2023 at 10:40

First name:
Martin

Last name:
Scott

Email:
Martin.Scott-1@sunderland.ac.uk

Programme name:
Master of Philosophy (MPhil)

Module name:
- not entered -

Last updated:
09/05/2023

Department:
School of Education

Applying as:
Student

Research project title:
The Good, The Bad & The Ugly of Teaching Maths in FE

Similar applications:
- not entered -

Supervisor

1. Supervisor

Name	Email
Dr Kate Duffy	kate.duffy@sunderland.ac.uk

Risk Assessment

Suitability

Adheres to BPS Code of Human Research Ethics (2021)?
No

Takes place outside UK?
No

Involves NHS?
No

Wondershare PDFelement

Healthcare research?
No

ESRC funded?
No

Involves adults who lack the capacity to consent?
No

Led by another UK institution?
No

Involves human tissue?
No

Clinical trial?
No

Social care research?
No

Risk Assessment

Does the study involve participants who are potentially or in any way vulnerable or who may have any difficulty giving meaningful consent to their participation or the use of their information?
No

Are participants to be involved in the study without their knowledge and consent (e.g. through internet-mediated research, or via covert observation of people in public places)?
No

Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited?
Yes

Does the research methodology involve the use of deception or activities which are conducted without participants' full and informed consent at the time the study is carried out?
No

Are there any significant concerns regarding the design of the research project?
No

Does the research involve any of the following groups?

a. children under 18 years of age?
b. vulnerable adults (eg people with learning or communication difficulties)
c. individuals who have a dependent or subordinate relationships to researchers
d. people in custody (eg young offenders or people in prisons)
e. individuals unable to give consent
f. individuals involved in illegal activities
g. therapeutic interventions

No

If the proposed research relates to the provision of social or human services is it feasible and/or appropriate that service users or service user representatives should be in some way involved in or consulted?
No

Are there payments to researchers/participants that may have an impact on the objectivity of the research?
No

Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?
No

Could the study induce unacceptable psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life? Will the study involve prolonged or repetitive testing?
No

Will the study involve discussion of sensitive topics? For example (but not limited to): sexual activity, illegal behaviour, experience of violence or abuse, drug use, etc.)
No

Are drugs, placebos or other substances to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?
No

Wondershare PDFelement

Will research involve the sharing of data or confidential information beyond the initial consent given?
No

Is there ambiguity about whether the information/data you are collecting is considered to be public?
No

Will the research involve administrative or secure data that requires permission from the appropriate authorities before use?
No

Will the research involve the use of visual/vocal methods that potentially pose an issue regarding confidentiality and anonymity?
No

The Data Protection Act 2018 will apply to any data-processing activities entailed by this research. Is there any cause for uncertainty as to whether the research will fully comply with the requirements of the Act?
No

Are there any particular groups who are likely to be harmed by dissemination of the results of this project?
No

Do you have any doubts or concerns regarding your (or your colleagues) physical or psychological wellbeing during the research period?
No

Will the research involve accessing security-sensitive material, such as material related to terrorism or to violent extremism of any kind, including, but not limited to, Islamist extremism and far-right extremism?
No

Summary

The MPhil/ PHD study is a narrative enquiry and is intended to capture the views of current FE practitioners, in relation to what is happening now and what is needed to improve maths teaching and learning. The research investigates upon the research question:
'What it is like to be a teacher, teaching Maths in Further Education?
Focusing upon the following key areas of investigation:
• What challenges are faced from a national, local, and personal perspective when teaching maths?
• What pedagogical approaches are utilised to address the challenges of teaching maths in F.E.?
The purpose of the study is to capture and record the interview with approximately 20 maths teachers in the Northeast of England, in terms of their approach taken to teach maths from Further Education Colleges and 6th Form providers. The research will investigate their experiences of the successes and frustrations of teaching within FE. The intention is to generate new knowledge, inform future delivery and influence decision makers; a chance to record what is happening right now within the sector.

Section B: Basic information

Proposed project duration

Start date (of data collection):
Thu 20 April 2023

Anticipated end date (of project)
Tue 31 October 2023

Indicators of risk

Involves potentially vulnerable participants?
No
Involves potentially highly sensitive topics?
No

Section C: Summary of research

1. Aims & Objectives

The aim of this research project is to inform the pedagogical approaches of maths teaching in the Initial Teacher Training phase. The outcomes will inform future delivery of maths and influence key developments.

'What it is like to be a teacher, teaching Maths in Further Education?'

Head of School Approval

Re: MPhil Maths Teacher Research (MS)

Duncan Cross (Staff)
To Martin Scott (Staff)

Reply | Reply All | Forward
Tue 21/02/2023 16:06

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Happy to prove Martin

Sent from my iPhone

On 21 Feb 2023, at 15:28, Martin Scott (Staff) <Martin.Scott-1@sunderland.ac.uk> wrote:

Hi Duncan, I am writing to seek permission to use my employed position at the University of Sunderland to support my research investigation named 'The Good, The Bad & The Ugly of Teaching Maths in Further Education'.
The research investigates the question: *'What is it like to be a teacher, teaching Maths in Further Education?*

Focusing upon the following key areas of investigation below:
1. What challenges are faced from a national, local, and personal perspective when teaching maths?
2. What pedagogical approaches are utilised to address the challenges of teaching maths in F.E.?

The aim of this research project is to inform the pedagogical approaches of maths teaching in the Initial Teacher Training phase.

It is my intention, under the academic supervision of Dr Kate Duffy to utilise my email address and the emails addresses stored in our partnership office to speculatively seek out volunteers to be involved in the study. The study will involve interviews with maths teachers working in Further Education and last no longer than 1 hour. All participants will sign up voluntarily, will be anonymised, have a right to withdraw from the study.

I have read and understood the attached study information and, by signing below, I consent to this study taking place, utilising UoS email addresses & contacts.	☐

Signed: _____Print name: _____

Thank you.
Regards Martin Scott
Senior Lecturer/Full Time Programme Leader PGCE (PCET)
University of Sunderland | Faculty of Education and Society
Wearside View | St Peter's Campus | Sunderland | SR6 0AN

For Wellbeing support, please click this link to access Student Support Services: https://sj.sunderland.ac.uk/student-information/support-services/

Ethics Approval

University of Sunderland

Downloaded: 05/04/2024
Approved: 09/05/2023

Martin Scott
School of Education
Programme: Master of Philosophy (MPhil)

Dear Martin

PROJECT TITLE: The Good, The Bad & The Ugly of Teaching Maths in FE
APPLICATION: Reference Number 016745

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 09/05/2023 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 016745 (form submission date: 01/05/2023); (expected project end date: 31/10/2023).
- Participant information sheet 1024161 version 3 (24/04/2023).
- Participant information sheet 1025561 version 1 (01/05/2023).
- Participant consent form 1024162 version 2 (24/04/2023).
- Participant consent form 1025562 version 1 (01/05/2023).

If during the course of the project you need to deviate significantly from the above-approved documentation please email ethics.review@sunderland.ac.uk

For more information please visit: https://www.sunderland.ac.uk/research/governance/researchethics/

Yours sincerely

Mrs Andrea Howell
Ethics Administrator
University of Sunderland

Social Media Adverts

The Good, The Bad & The Ugly of Teaching Maths in Further Education

I am looking for current maths teachers to voluntarily discuss their experiences and approaches to teaching maths in FE.

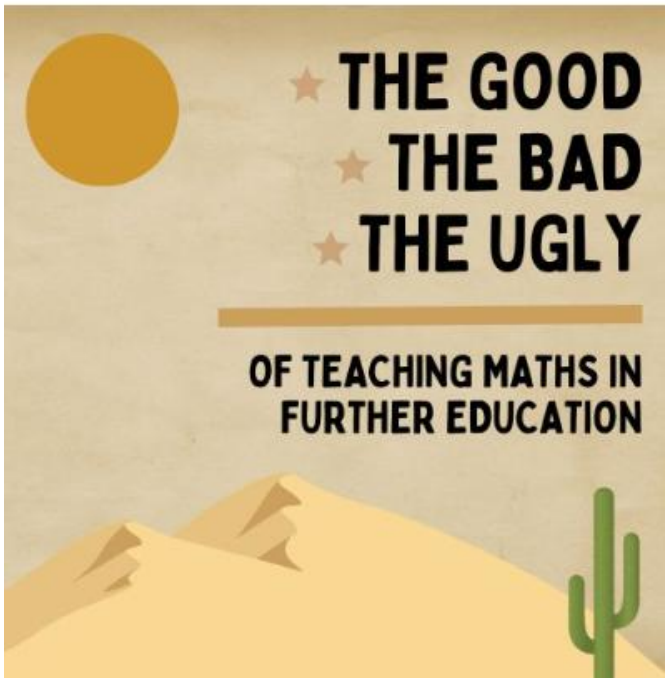
This research aims to inform the pedagogical approaches of maths teaching in the Initial Teacher Training phase. The outcomes will inform future delivery of maths and influence key developments.

Data collection will be in the form of semi-structured interviews, anonymously recording suggestions that relate to developing the practice of maths teachers in ITT.

Being aware of restrictions to your time, meetings will be swift, informal and at a time that suits you. Interviews will last no longer than hour, *all of which will be conducted informally and over a coffee!*

Wouldn't it be great to inform the next generation of maths teachers of your experiences of teaching maths in Further Education in the Northeast of England? Get involved and share stories! If you are interested, or would simply like to find out more, please get in touch via email martin.scott-1@sunderland.ac.uk *or DM me directly!*

I am looking for current maths teachers from the Northeast of England to voluntarily discuss their experiences and approaches to teaching maths in FE.
This research aims to inform the pedagogical approaches of teaching maths during the Initial Teacher Training phase. The outcomes will inform future delivery of maths ITT and influence key developments.
Data collection will be in the form of semi-structured interviews, anonymously recording suggestions that relate to developing the practice of maths teachers in ITT.
Being aware of restrictions to your time, meetings will be swift, informal, can be online and at a time that suits you. Interviews will last no longer than hour, all of which will be conducted informally and over a coffee!



The Good, The Bad & The Ugly of Teaching Maths in Further Education.

Participant Information Sheet

Attention…Further Education (FE) Maths Teachers!

I am developing a narrative enquiry study as part of MPhil/ PHD research regarding the experience of maths teachers working in Further Education (FE) and looking for willing participants to be involved.

As an independent researcher, I am intending to capture the recent experiences of maths teachers from a range of providers across the Northeast of England. All outcomes will anonymous (in accordance with BERA ethical guidelines).

What is involved?

I am looking for current maths teachers to discuss their experiences and approaches to teaching maths along with recording any suggestions in relation to developing the practice of maths teachers in ITT.

Being aware of restrictions to your time, meetings will be swift, informal and at a time that suits you.

Data collection will be in the form of semi – structured interviews, for no longer than hour, *all of which will be conducted online via MS Teams or at a venue of your choice, informally and over a coffee!*

What is the research all about?

The MPhil/ PHD study is a narrative enquiry and is intended to capture the anonymous views of current practitioners, in relation to what is happening now and what is needed to improve teacher/ learner experience & outcomes. The research has a working title of '*The Good, the Bad and the Ugly of Teaching Maths in Further Education.*'

The research investigates upon the research question:

'What it is like to be a teacher, teaching Maths in Further Education?

Focusing upon the following key areas of investigation below:

- What challenges are faced from a national, local, and personal perspective when teaching maths?
- What pedagogical approaches are utilised to address the challenges of teaching maths in F.E.?

What does this mean for you?

The purpose of the study is to capture and record experiences in terms of the approach taken to teach maths, the successes, and frustrations of teaching within FE. The aim of this research project is to inform the pedagogical approaches of maths teaching in the Initial Teacher Training phase. The outcomes will inform future delivery of maths and influence key developments. This is a chance to record what is happening right now within the sector and record suggestions to move forward.

Being maths teachers that currently operate within FE, there is nobody better placed than you, to inform future practice!

The study will allow you an opportunity to record / reflect upon your teaching career and approaches to teaching maths, any recent changes within the sector and what makes maths teaching both a joy and a challenge to you.

Wouldn't it be great to inform the next generation of maths teachers of your experiences of teaching maths in Further Education in the Northeast of England? Get involved and share stories!

If you are interested, or would simply like to find out more, please email me to get in touch!

Martin Scott - Lecturer – Post Compulsory Education & Training (PCET) PGCE - University of Sunderland

martin.scott-1@sunderland.ac.uk (0191 515 2116) Martin Scott | LinkedIn

Consent Form

Consent Form

Current working title of Study: The Good, the Bad and the Ugly of Teaching Maths in Further Education.

The research investigates upon the research question:

'What it is like to be a teacher, teaching Maths in Further Education?'

Focusing upon the following key areas of investigation below:

- What challenges are faced from a national, local, and personal perspective when teaching maths?
- What pedagogical approaches are utilised to address the challenges of teaching maths in F.E.?

Participant code: _____

I am over the age of 16	☐
I have read and understood the attached study information and, by signing below, I consent to participate in this study	☐
I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.	☐
I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded.	☐
I agree to the use of anonymised quotes in publications.	☐
I agree that my data gathered in this study may be shared (after it has been anonymised) with other researchers.	☐
I agree that my data gathered in this study may be shared (after it has been anonymised) may be used for teaching purposes.	☐

Signed: _____Print name: _____

(Your name, along with your participant code is important to help match your data from two questionnaires. It will not be used for any purpose other than this.) All interviews will take place by the end of July. Participants transcript can be requested to be withdrawn up to 2 weeks following interview.

Witnessed by: _____Print name: _____ Date: _____

Contact for further information.

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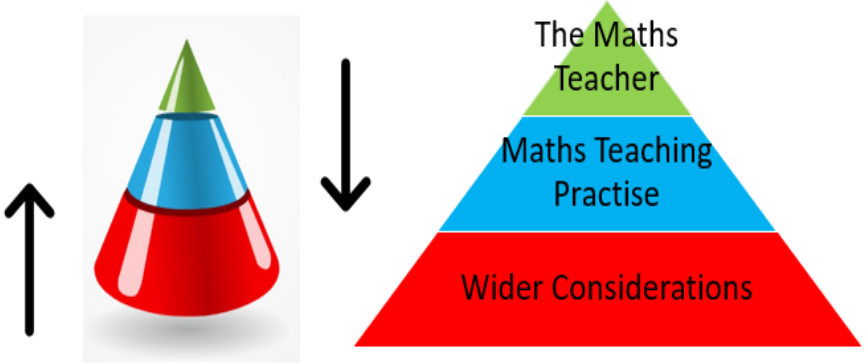
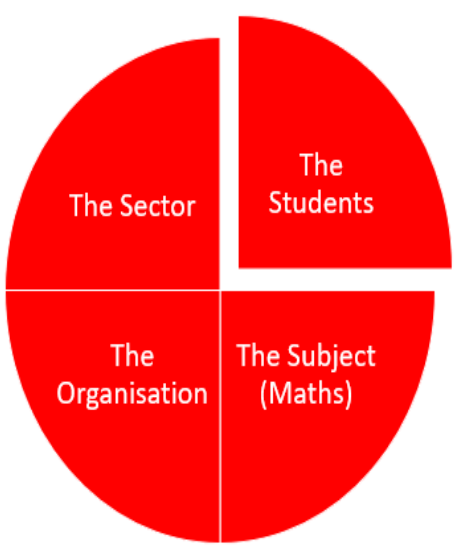
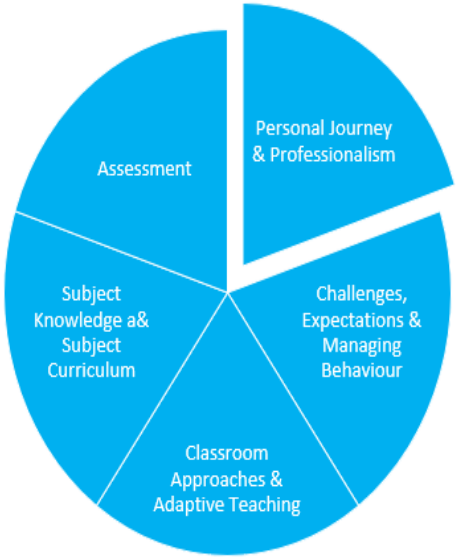
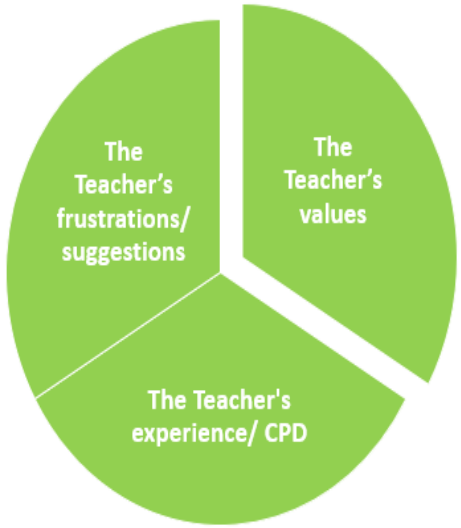
Making sense of the issues ...Getting the questions right...



In such a complex and challenging area – it is important to get to the source of the research whilst also understanding the context in which the curriculum is delivered – on that note the questions, although themed, are intentionally open to allow participants to express their view – however it is important for the researcher to understand the layers identified in this graphic of why teaching practise may be influenced in a particular way.







Understanding that this is 2 way – the wider consideration can influence practise and in turn the teacher – but the teacher can also influence practices and in turn the wider considerations

- Personal Journey & Professional Behaviours - How maths teachers in FE perceive and construct their professional identity within the context of their roles and responsibilities.

1. **Personal Journey and Professional Behaviours**

- What led you to get into teaching?
- What have you done prior to teaching?
- Why maths? Why FE?
- What are your core responsibilities for teaching maths? Are you able to achieve this?
- What do you think the perception of maths/ maths teachers is within the organisation/ society?

- Challenges, Expectations and Managing Behaviour - The key challenges and obstacles faced by FE maths teachers in their daily practice, including issues related to student engagement, diverse learning needs, and workload management.

2. **Challenges, Expectations & Managing Behaviour.**

- Is your maths teaching what you originally thought it would be like?
- Where in the organisation do you teach – what is your physical environment like?
- Do you have any additional responsibilities that enhance or distract from your core responsibilities?
- What are the main challenges that learners face when learning maths?
- What do your learners generally say when learning maths? - Why do you think they say that?
- What do you think your learners need?
- Do you have the space, capacity, skills, or knowledge to influence learner concerns?

- Classroom Approaches & Adaptive Teaching - The strategies and approaches employed by FE maths teachers to overcome challenges, foster student motivation, and promote effective learning experiences.

3. **Classroom Approaches and Adaptive Teaching.**

- Before teaching, what are the factors that need to be considered when teaching maths in FE?
- Do you utilise any pre-paid resources or technology when teaching maths?
- What approach do you take to teach maths?
- Could you explain your understanding of the approach that you use?
- What are the challenges/ success of this approach?
- Are you able to move away from this approach if it is needed?

- Subject Knowledge & Subject Curriculum - How FE maths teachers perceive the impact of their work on students' mathematical skills, confidence, and future prospects.

4. Subject Knowledge & Subject Curriculum.

- What maths qualification is it that you teach?
- What do you think makes teaching maths effective?
- What are the challenges associated with teaching this qualification?
- How do you develop your subject knowledge?
- What training, mentoring or support have you had to support your role?

- Assessment – The different perceptions, strategies, challenges, and impact of assessment of F.E. maths qualifications

5. Assessment

- Thinking about assessment, what are the main considerations to make in the classroom?
- What are the challenges of in relation to assessment, with your learners?
- Are you aware of the national priorities in relation to maths teaching and learning?
- Do you feel maths teaching and learning is related to the wider society/ national needs?
- What do you think the perception of maths/ maths teachers is within the organisation/ society?

- Additional Suggestions to Improve Maths Teaching & Learning - To explore FE maths teachers' experiences of professional development, collaboration, and support within their institutions and the wider education systems and suggestions that they may have for future delivery.

6. Additional/ Suggestions to Improve Maths Teaching & Learning

- What is the reality like of teaching maths (from your perspective)? Are you happy in this role?
- What brings you joy in your T&L learning
- What are the biggest successes and challenges of teaching maths?
- Is there anything that you are doing that you would like to share with others?
- What do you think should be done to improve maths teaching and learning – locally/ nationally?

Domain 1: Personal Journey and Professional Behaviours
Prompts: • What led you to get into teaching? • What have you done prior to teaching? • Why maths? Why FE? • What are your core responsibilities for teaching maths? Are you able to achieve this? • What do you think the perception of maths/ maths teachers is within the organisation/ society?
1) **Main Themes:** Pathway into teaching - unplanned entry, was not interested initially, thought teaching would be awful encouraged by others who saw potential. Convenient opportunity close to home. Mentorship: Critical mentor who built skills and confidence. Team teaching enabled observation and mimicking of effective practices. Subject Connections: Hated English, loved maths due to logic/consistency. Maths clicked while English was a struggle due to dyslexia. Motivations: Spending more time with family, Supportive team environment. Background in psychology and delivering prison rehabilitation programmes, PGCE was convenient on route home from prison job. Mentorship: Veteran teacher created all lessons and resources, Gradual skill building through team teaching model. Subject Connections: English has no logic, maths never changes. Maths is practiced and repeated. Motivations: Long commute to prison job, young kids at home, Friendly maths department team I**n summary**: key themes indicate an unplanned entry into FE maths teaching driven by convenience/work-life balance and enabled by a strong mentor. The subject fit emerged due to perceptions of maths as logical and straightforward compared to humanities.
2) **Main Themes**: Unplanned entry into teaching - Asked to teach specialist units with a relevant degree, said yes without hesitation when asked to teach Started teaching before completing degree - Expanding scope - Picked up additional roles to fill spare time - No intention of becoming a teacher initially - Expanding teaching scope - Preferred and was better at maths - Evolving pathway - Added maths teaching to science role - Moved into fully teaching functional skills maths - Evolving career pathway - Progressed from science to maths focus - Now a curriculum lead at a college. Held roles across multiple colleges -Years of experience now in further education. **In summary**, the key themes indicate the participant unintentionally fell into maths teaching without seeking it out, continually expanded her teaching areas starting with science, and has progressed through an evolving FE career pathway. Her varied employment history underscores the fluidity of FE teaching roles.
3) **Main Themes:** Unplanned teaching entry - Suggested while visiting college with daughter - Fell into maths/English teaching accidently - Building teaching scope - Started with ad hoc sessional work - scope: Covered absence initially - Hours grew over time - Leadership need: Wanted to bring staff together - Supportive management helped. Moved into full-time English teaching - Recognising leadership need - Could see department – struggling - Had vision to improve culture. Retail background then finished degree - Flexible PGCE enabled - work-family balance.

In summary, key themes show the participant unintentionally entered FE teaching through encouragement, expanded her teaching remit over time, and pursued a leadership role after recognising gaps in the maths department's cohesion that she felt equipped to fill. Her varied employment history highlights the fluidity of FE roles.
4) **Main Themes:** Accidental entry -Intended to teach history -Ended up in maths/English. Preferring maths teaching -Clearer cut than English -Enjoys the "lightbulb moments". Specialised in maths later on, found it more enjoyable. Preferring maths: -Multiple ways to teach concepts -Adult learners often uneasy with English. Building confidence: -Tearful when passing after struggles -Shy student opened up. Core goals: -Attendance itself a challenge -Any level of qualification a boost. Building confidence -Overcoming past failures -Getting reluctant students to try. Core goals - Engaging the disengaged -Qualifications and progression. **In summary,** key themes indicate the participant unintentionally transitioned to maths teaching, prefers its clear-cut nature and seeing growth, focuses first on re-engaging anxious learners then building their skills and celebrating wins. Lightbulb moments and overcoming self-doubts are positioned as key responsibilities and motivators.
5) **Main Themes**: Accidental entry - Applied for different role - Saw opening by chance - Stayed in FE since -Influential teachers: Changed perception - Good and bad examples stick - Fostering enjoyment: Engagement over top grades - Gets them to want to learn more - Memorable contexts: Relatable topics engage - small things can have big impacts. Offered lecturer job - Influential teachers - Made maths interesting and fun - Inspired subject choice - Positive experiences key - Builds motivation and confidence - Memorable contexts - Sports analytics lesson - Sparked student's career direction. **In summary,** key themes indicate the participant unintentionally fell into FE maths teaching after aiming for a different role, own subject choice was shaped by the teaching approach of his school maths instructors, participant consequently prioritises sparking enjoyment and engagement over achievement in students, made possible by contextualised and applied lessons which sometimes influence careers.
6) **Main Themes:** Accidental entry - Admin role first - Volunteered initially - Found opportunity to shift. Leveraging strengths: - Enabled quick employment - Facilitated career transition. Developing interest: Exposure through subbing - Training opened new insights. Shifting pedagogy- Teacher as sole authority ingrained, - Constant battle with old habits. Transitioned into teaching. Leveraging strengths - Accounting background- Good English skills. Developing interest - Covering classes - Specialised maths course sparked passion. Shifting pedagogy - Taught traditionally - Challenging to adapt style **In summary,** key themes indicate the participant moved into maths teaching after starting in an administrative role, was able to leverage existing maths and language skills, grew interest by covering classes and pursuing training, but struggles to shift ingrained traditional teaching approaches to more modern student-centred techniques.
7) **Main Themes:** Journey to teaching mathematics- participant always wanted to be a teacher but circumstances delayed it initially- Worked in a bank for 10 years before getting a teaching degree- Realised passion for mathematics pedagogy after teaching for some years - Became

a maths advisor, lecturer, programme leader over time. Understanding versus procedure in mathematics - As a student, could follow maths procedures/calculations but lacked true understanding - Teaching maths helped gain deeper conceptual understanding - Appreciation for unpacking maths concepts and developing flexible thinking. Motivation for teaching maths - Loves thinking about numbers, mathematical relationships- Enjoys the challenge of making maths engaging and understandable - Wants every child to enjoy maths. Development of mathematical identity - Early confidence issues with maths ability despite being skilled procedurally- Teaching transformed relationship with maths and self-perception. Responsibility as a maths teacher - Instilling enjoyment of maths in students- Developing true understanding, not just procedures. **In Summary**, the key themes revolve around participants personal journey with mathematics, evolving from procedural skills to deeper conceptual understanding through teaching. Participant's passion stems from making sense of mathematical concepts and helping students achieve that same kind of flexible, engaged understanding.
8) **Main Themes:** Pathway into teaching mathematics – participant studied a sports degree with plans to become a P.E. teacher- Gained experience as a teaching assistant and academic mentor - This stepwise progression into a maths teaching role was very beneficial. Value of observing experienced teachers - Being able to see effective teaching strategies modelled was invaluable - The mentoring role allowed participant to learn what works/doesn't work for students- Wishes they were able to continue observing peers to keep improving his own practice. Struggle without the preparatory experiences - feels they would have really struggled if thrown directly into lecturing- May have been overconfident and taken the wrong approaches initially- The incremental buildup was crucial for contextual understanding. Importance of relatability and differentiation - Recognises students learn differently based on their subject areas - Wants to know how to teach maths concepts to different vocational groups- Highlights the need for varied strategies, not one-size-fits-all. Benefits of collaboration and shared knowledge - Appreciates being able to learn from colleagues' expertise - Sees value in team-teaching or observing one another's classes- Shared ownership and crosspollination of effective practices. **In Summary:** The central narrative revolves around progressive entry into maths teaching, made possible and enriched by experiences mentoring and observing other practitioners along the way. This allowed participant to avoid common pitfalls, build contextual awareness, and develop an appreciation for differentiated, student-centred pedagogy. Continued collaboration emerges as important for ongoing development.
9) **Main Themes**: Transition from Teaching Passion to a new Subject Area - originally taught immunology in an access program they enjoyed - Was then assigned to teach functional skills maths, which was very different - Felt like a "fish out of water" entering an established maths teaching team. Contrasting Pedagogical Approaches - focused on logically breaking down steps, unlike some maths colleagues - Students responded well to step-by-step methodology for explanations - Created some tensions with existing maths faculty over differing styles. Challenges of Being an Outsider - Felt wasn't fully accepted by the long-standing maths team as a newcomer - Perceived as threatening change to their comfortable status quo – Participant struggled without former supportive professional community. Providing Quality Student-Centred Instruction - Passionate about delivering quality teaching focused on student needs - Went above and beyond to support students, like securing

needed technology - Students appreciated and recognised effective pedagogical approach. Institutional Priorities and Perceptions - Maths seemed viewed as just a "means to an end" for funding purposes - Focus on getting "bums on seats" rather than quality of instruction - qualifications/title were often disregarded or mispronounced.

In Summary: The key themes involve challenging transition to a new content area participant was passionate about but perceived as an outsider, creating friction with existing faculty over contrasting teaching styles. However, the student-centred ethos and quality instruction were recognised by learners, even if not fully valued institutionally. This complicated situational context merged from clashing priorities between enrolment, funding, and pedagogical excellence.

10)
Main Theme: Passion for Teaching Mathematics – Participant expresses a deep love for both mathematics itself and the act of teaching maths -finds teaching maths highly rewarding and impactful - This passion drove to continually take on more maths teaching responsibilities. Expanding Scope and Influence- Started out teaching GCSE and functional math classes part-time- Gradually expanded to full-time teaching, then management roles- Sought opportunities to have a wider influence through teacher training, authoring, consulting. Cross-Sector Experience - Experience teaching maths across further education, schools, and training providers - Obtained qualified teacher status to be able to teach in schools - Worked with local authorities and universities on maths education. Bucking Negative Trends- students' maths achievement bucked negative national trends - This success and impact led to further opportunities to share practices. Embracing Challenges- Enjoyed taking on challenging teaching roles with struggling students- Relished the opportunity to have impact with hard-to-reach adolescents. Holistic Development as an Educator- Continuously developing new skills like management and teacher training - Expanded abilities from FE into school sectors over time - Sought out diverse opportunities for professional growth.

In Summary: The central narrative revolves around participant's deep passion for mathematics education, which motivated to continually expand skills, and influence. Rather than remaining stagnant, embraced new challenges across sectors and took on diverse roles from teaching to training to leadership. Students' notable successes afforded participant a wider platform to share effective practices.

Domain 2: Challenges, Expectations & Managing Behaviour.
Prompts: • Is your maths teaching what you originally thought it would be like? • Where in the organisation do you teach – what is your physical environment like? • Do you have any additional responsibilities that enhance or distract from your core responsibilities? • What are the main challenges that learners face when learning maths? • What do your learners generally say when learning maths? - Why do you think they say that? • What do you think your learners need? • Do you have the space, capacity, skills, or knowledge to influence learner concerns?
1) **Main Themes:** Perceptions and Fears of Maths, very strict historically, Created barriers and discomfort with subject. Society has maths anxiety, Stems from prior school experiences. Teaching Approach: One rigid way of teaching previously, Harder than needed for many students. Personal Maths Ability: Major improvement from school days, can now do math easily from experience Traditional methods were inflexible, Multiple approaches needed based on learner, Personal Maths Ability - Was previously weak at maths but now very skilled and comfortable teaching in current Teaching Role, Redundancy led to new business model – Maths specialists supporting workplace maths/English needs. Current Teaching Role: Formed own company due to college cuts. Apply specialist skills to organisational training. **In summary:** key themes show societal anxieties about math rooted in traditional didactic teaching methods, contrasted by the participant's own transformative journey with maths teaching ability and shifting to a new personalised training business model after redundancy. Redundancy appears to have enabled business innovation tailored to workplace skills gaps.
2) **Main Themes:** Gateway for opportunities - Maths skills open doors for careers and prospects - progression into nursing, medicine etc. - Small link in a wider chain – Part of helping society function - Perceptions of maths teachers - Authority figures but appreciated later - Provide stability and routine - Considerations for student - Managing college freedom - Additional needs require structure. Students initially dislike discipline - Fully value approach after passing- Student Considerations: Chaotic external lives. Realise later actions had purpose. **In summary**, key themes indicate maths is positioned as a gateway enabling wider career and study options, teachers balance authority with providing stability, and approaches consider student needs around regulation and appreciating the teaching rationale. The excerpt highlights the role math skills play in unlocking opportunities, along with ways math classrooms support vulnerable students.
3) **Main Themes**: Building relationships: Walking and talking to collaborate - Links were missing Engagement: Tease out old knowledge. Bite-size chunks not overwhelming. Value: Some still question relevance. Appreciation is improving. Mandates: Exam trips clash with tests. Lessened but still a frustration Communication is key challenge, takes work but becomes natural, Engaging learners, create safe environment, overcome maths anxiety, Valuing maths teachers, Stereotype of "brainy professors" fading, Still battles for parity of esteem. Recognising maths mandates, English/maths fight for focus, Essential for funding despite resentment.

In summary, key themes indicate communication and relationship building are essential but tricky, teacher's core role is overcoming ingrained maths anxiety, societal perceptions are evolving, and mandated maths qualifications cause ongoing contention despite increased recognition of their importance.
4) **Main Themes:** Undervalued department - Seen as an "add-on" - Gets the "short straw" on resources. Other areas take priority - Not integral to "main" programmes - Physical limitations: Preparation time lost - Stifles ideal student experience - Additional tasks: Who does what unclear - Too many people involved - Consequence inconsistencies: Final warnings not enforced. Attend vocational but not maths. Physical limitations - Small, neglected classrooms - Moving rooms and equipment disrupts. Additional tasks - Chasing attendance distracting - Responsibilities not clearly delineated - Consequence inconsistencies - Policies not followed - Lack of communication causes confusion. **In summary,** key issues relate to maths not being seen as crucial within colleges, unsuitable teaching spaces, admin burdens that detract from core goals, and policies around behaviour and attendance not being consistently upheld or communicated, allowing maths to be deprioritised.
5) **Main Themes:** Lingering negativity - Fear of maths amongst staff - Reluctance to participate in training - Insight on learner dynamic difference - Lip service: Support difference noticeable - Main programmes finish early - Pre-lesson obstacles: Online no-shows too - Focus on the willing - Contact time: Short to assess and build confidence - Tailor approach over time. Translates to poor student perceptions - Lip service remains - Still not fully integrated - Lower priority scheduling - Pre-lesson obstacles - Chasing attendance - Refusal to attend in person - Student contact time - 5 minutes per lesson - Rapport building takes months. **In summary**, key issues relate to residual maths anxiety amongst staff that influences student outlooks, maths still being perceived as an add-on, chasing attendance detracting from teaching preparation, and extremely limited contact time to assess, build rapport, and confidence.
6) **Main Themes**: Cultural perceptions - Low value placed on maths - Maths competency not expected - Parents' attitudes influence kids. Limited aspirations: - Low-wage jobs seen as enough - Short-term financial focus. Insufficient support: Maths de-prioritised - Minimal cross-curricular integration. Contrast with participant's background- Frustration at not having needs met as a teacher- Feeling overworked and unable to meet lesson aims- Lack of support from vocational colleagues. Limited student aspirations- No long-term planning - Benefits mentality restricts motivation- Low level vocational courses not stretching students - Maths ability not really valued across the organisation - Students' maths potential not being developed. Insufficient institutional support - Lip service but no actions - Vocational areas' disinterest- Maths and English are the mandatory, funded elements - In practice, vocational subject is treated as the priority- Maths and English put "on the periphery" despite funding- Low level vocational courses not stretching students- Maths ability not really valued across the organisation - Students' maths potential not being developed. Unrealistic class scheduling - Back-to-back long sessions- Learners can't focus that long. Timetabling and resourcing issues- Maths classes timetabled at inconvenient times- Unsuitable or overcrowded classrooms allocated- Vocational programs get disproportionate teaching hours - 3 hours too much for complex needs- Mixes levels in same long block. Lip service paid to maths importance - Leaders "saying the

right things" about maths and English - But this is not translating into concrete actions- Suggests maths is an inconvenient bolt-on vs core subject - Claims of embedding maths but only for observations - Lack of collaboration between maths and vocational tutors - Missed opportunities to utilise vocational hours for maths.

In summary, the main themes relate to practical barriers teachers face, the mismatch between policy and practice on math's importance, and the low status of maths despite its central funding role. This is leading to maths teacher frustration and students not maximising their mathematical potential. Key challenges relate to maths being culturally undervalued, learners not seeing it as crucial for their modest life goals, colleges reinforcing math's low status compared to vocational training, and impractical scheduling of overly long sessions often combining multiple course levels.

7)
Main Themes: Instilling enjoyment and belief in maths ability – participant sees key responsibilities as helping students enjoy maths and believe they can do it - Overcoming negative attitudes and fear of being wrong is crucial. Perception of maths and maths teachers - Maths is viewed as a "geeky", "uncool" subject in society - Maths teachers are stereotyped as "brainy" and not trendy - Within schools, maths is seen as a "harder" core subject that is more important but more likely to have failures. Challenges in teaching maths - Initially thought teaching would be easy since procedures could be followed - Realised lacked true conceptual understanding of maths- Developing positive learning behaviours is essential before teaching concepts- Winning over students with negative attitudes is a major hurdle, up to 50% of a class. Evolving pedagogical understanding - Discovered importance of representations, manipulatives for understanding - Moving away from just rote procedures to developing flexibility- Having to unlearn own procedural style of learning maths. Influence of previous teaching approaches - Students' prior experiences with more rigid, answer-focused teaching impacts their responsiveness - Overcoming that fixed mindset mentality is an uphill battle.
In summary, the key themes revolve around confronting societal perceptions, prior student experiences, and participant's own evolution in appreciating conceptual maths understanding beyond procedures. Fostering enjoyment, belief and positive learning behaviours emerges as crucial before even getting to the maths concepts themselves.

8)
Main Themes: Relatability with FE learners- relate to FE students more as an adult/mentor figure- The age of FE students allows for a different kind of rapport- Sees their background in learning support as helpful for this dynamic. Importance of planning and preparation - Recognises the need to plan everything thoroughly - Not at the stage yet where they can be more spontaneous in lessons- Feels more comfortable when he knows exactly what will be covered. Contextualising maths for vocational areas - Believes contextualising maths to students' subject areas is key- Can effectively plan sport-based maths lessons for sports students - But wants to learn how to contextualise appropriately for other vocations. Challenges with curriculum coverage - Limited timeframe makes it difficult to fully contextualise - Has to find ways to integrate it into normal lesson delivery - Not able to teach their ideal contextualised way all the time. Focus on employment skills and future utility - Core responsibility is teaching maths skills for employment - Prioritising math's practical applications in various careers - Moving beyond just mastering procedures to real-world relevance.

In Summary: The central tension seems to be between participant's desire to contextualise maths instruction by making it directly relevant to students' vocational pathways, and the time/curriculum constraints that limit how thoroughly they can pursue that contextualised

approach. However, participant sees contextualising maths for employment purposes as a crucial responsibility and motivator for FE learners with whom they can relate as an adult mentor figure.
9) **Main Themes**: Student-Centred Approach - made strong personal connections with students - Spent significant time getting to know them as individuals (estimated 70%) - Saw this relationship-building as crucial for effective teaching. Providing Logically Scaffolded Explanations - Focused on breaking down step-by-step processes and having students follow along - Used analogies and real-life examples to make maths relevant - Let students check their work to verify understanding. Addressing Negative Attitudes and Maths Anxiety - Many students came in with preconceived notions of disliking/struggling with maths - Had to overcome these barriers and perceived lack of relevance - Breaking down the logic helped students see maths differently. Contrasting Teaching Styles - stepwise explanatory approach differed from some colleagues - Students appreciated the clarity of seeing each logical progression - Created some tensions with existing maths faculty over pedagogy. Barriers to Conceptual Understanding - Worried students would just memorise processes as "magic tricks" without grasping why - Pushed them to understand the reasoning behind operations - Enabled them to generalise processes to new contexts. **In Summary**: The central themes involve participants' student-centred philosophy focused on relationship-building, making maths relevant/anxiety-free through clear logical scaffolding and real-world connections. The pedagogical approach of unpacking concepts step-by-step contrasted with some colleagues and helped overcome common barriers to student understanding. Overall, an empathetic style centred on conceptual mastery.
10) **Main Themes**: Passion for Mathematics Education – Participant expresses a deep love for both mathematics and the act of teaching maths - This dual passion was the driving force behind career path. Starting from Humble Beginnings - Initially taught part-time maths classes like adult community learning - Used hands-on, everyday examples like egg boxes and cereal boxes - A stark contrast to the expansive roles they would later take on. Embracing Challenging Learners - Enjoyed working with disengaged, at-risk youth like through NEET training - Saw the value of mathematics qualifications in opening doors for these students - Relished the challenge of reaching and motivating difficult adolescents. Evidence-Based Pedagogy - Emphasises grounding teaching approaches in educational research - Cites works on factors leading to post-16 disengagement as "seminal" - Focuses on addressing lack of confidence, negative past experiences, perceived irrelevance. Developing Rapport and Premeditated Responses - Acknowledges common refrains like "I hate maths" need strategic, caring replies - Collects and shares impactful responses from other teachers - Aims to start positively and rebuild student confidence/enthusiasm. Multi-Faceted Professional Development - Continuously expanded skills into teacher training, curriculum design, conferences - Embraced opportunities across sectors - FE, schools, training providers - Joined subject associations to connect mathematics ability and pedagogy. **In Summary:** The key themes revolve around participants humble beginnings using hands-on teaching methods, which gave way to a research-informed, multi-dimensional approach focused on rebuilding rapport and confidence with disengaged students across sectors. Passion coupled with continuously developing pedagogy, subject expertise and training proficiencies fuelled an expansive career journey.

Domain 3: Classroom Approaches and Adaptive Teaching.
Prompts: • Before teaching, what are the factors that need to be considered when teaching maths in FE? • Do you utilise any pre-paid resources or technology when teaching maths? • What approach do you take to teach maths? • Could you explain your understanding of the approach that you use? • What are the challenges/ success of this approach? • Are you able to move away from this approach if it is needed?
1) **Main Themes:** Creating a Supportive Learning Environment. Trauma-informed communication, Destigmatise and humanise maths. Adaptive Teaching: Affective factors first, not content. Meet them where they are. Curriculum Alignment: Literacy barriers impact maths. Functional questions have more value. Teaching Identity: All students treated equitably. Calm and consistent persona Different from school approaches. Building confidence and resilience. Adaptive and Responsive Teaching. Getting to know learners first. Assessing level then scaffolding up. Curriculum and Assessment Alignment. Focus on core maths skills. Contextualise to reality and interests. Consistent Teaching Identity. Equal respectful relationships. Avoid power differentials. **In summary,** key themes emphasise creating a destigmatised environment to rebuild maths confidence, getting to know students first before assessing gaps and responsive teaching, focusing on functional literacy and maths alignment, and maintaining an equitable teaching persona across all learners.
2) **Main Themes**: Structured routines. Some standardisations across department. Teachers adapt materials to needs. Tracking Progress: Quantitative data between assessments. Identify and address discrete gaps. Adaptive Content: Fix deficiencies in a few starters - Full lessons focus on multiplication skills. Intentional start and end activities - Provides stability and expectations - Tracking progress - Repeated starters show growth - Builds confidence before exams - Adaptive content - Target procedural gaps - Balance memory vs problem-solving. **In summary,** key themes cover the role of classroom routines in providing stability, use of starters to quantify and build skills, and how content is tailored based on procedural vs conceptual gaps. There is some departmental coordination on materials, but teachers modify them based on their learner needs. The focus on data and responsive content highlights the adaptive teaching approaches.
3) **Main Themes:** Physical environment Rainy treks across campus- Define the maths space. Own classrooms or clusters- Storage for multiple groups. Mental health issues to support - Steps to get to know individuals - Engagement: Hook interest with problem-solving - Achieve grades through listening - Collaboration: Impacts communication - Nightmare to align timetables. Class size challenges - Cap of 20 but rooms too small - Budget cuts mean understaffed - Student engagement - Honesty about usage - Make budgeting relevant -

Collaboration difficulties - Imbalanced department numbers - Matrix structure causes headaches.

In summary, key themes relate to the impact of unsuitable physical spaces, large classes and staffing shortages, use of functionality and relationships to engage reluctant students, and complications collaborating across skewed department sizes and poor structures.

4)

Main Themes: Building confidence- Go back to basics - One-to-one tailored support - Overcoming barriers - Concrete examples - Link topics to show progress - Differentiated activities. Address missed concepts - Physical demonstrations - Overcoming barriers: - Abstract concepts too advanced - Apply methods to other skills - Differentiated activities: Hands-on or worksheets. Build on successes - Time pressures: Less time than schools - Buy-in first then content. s - Match approaches to levels - Group work for lower abilities - Managing time pressures - Streamline content - Balance engagement and topics.

In summary, key themes cover going back to fundamentals to fill gaps for those lacking basic skills, using concrete examples before abstraction to rebuild confidence, offering tiered activities suited to levels, and balancing time spent on engagement with teaching accelerated content within tight schedules.

5)

Main Themes: Fostering engagement Maths "sales pitch" - Gradual build to challenging material. Rapport: Shows the relevance - Get to know backgrounds. Balancing: Ideal learners need less effort - Problem students drain time. Support deficiencies: Quick intervention changes dynamics - Lone teachers helpless. - Fun activities and games - Tap into interests - Building rapport - Research and relate to students - Leverage influencers - Balancing focus - More winning over initially - Shift to content later - Support deficiencies - Backing not always available - new staff vulnerable.

In summary, key themes relate to strategically fostering enjoyment via customised games and contexts to "sell" the merits of maths, intentionally developing relationships by researching student interests/needs and leveraging influencers, balancing the time spent on engagement tactics with teaching content depending on receptiveness, and vulnerabilities due to inconsistent backup when behaviour issues arise.

6)

Main Themes: Disconnect between vocational and maths delivery - Vocational courses finish early while maths continues - Maths teachers struggle to complete curriculum in time - Vocational areas have abundant time for enrichment. Low maths starting points of students- Many students working at primary school level- surprising number of adults with very basic maths skills- Increasingly low levels (Entry 1-3) each year. Challenges of differentiation with large classes- Range of maths backgrounds and methods in same class- Moving students on from inefficient calculation methods- Providing 1:1 support with classes of 25+ students. Student behaviour and engagement challenges - Misbehaviour more common in maths than vocational classes- Students don't see relevance of maths to their lives- Induction doesn't emphasise importance of maths enough. Maths seen as "punishment" and barrier to student aspirations - Vocational tutors using maths as a threat/punishment - Students wanting to focus on vocational to get jobs - Maths preventing progression despite vocational success. Lack of planning for students with additional needs- High numbers of students with education, health & care plans - Little advance planning for how to support their needs-

Environment and class sizes unsuitable for their learning. Teacher self-doubt and questioning of ability- Challenging teaching context leading to self-doubt- Questioning if they are the right person to teach the students- Worry about being unable to meet learners' significant needs. Lack of support and status for maths teachers - Maths issues dismissed or blamed on the maths teacher - Lack of maths teachers progressing to management roles - Feeling maths performance doesn't get fair recognition.

In summary, the main themes relate to tensions between maths and vocational learning, the very low starting points of many students, the challenges of differentiation with large classes, lack of student engagement in maths, lack of whole-organisational support for maths, and the impact of the challenging context on teacher self-efficacy and retention. The teacher seems to be reaching a crunch point where the challenges feel insurmountable within the current structures.

7)
Main Themes: Contextualising mathematics - Importance of making maths relevant and connected to real life scenarios - Using analogies and examples students can relate to - Helping students understand the "why" behind maths concepts. Flexibility vs rigidity in teaching - Being willing to deviate from prescribed curriculum/schemes if needed - Avoiding rigidly sticking to pacing guides at expense of understanding- Value of teacher autonomy to make professional judgments. Depth vs breadth- Covering everything superficially vs focusing on key concepts deeply - Strategic omission/rearranging of topics based on curricular priorities - Building conceptual foundations before proceeding. Balancing understanding and exam preparation - Tension between fostering true comprehension and "teaching to the test" - Ethical dilemma of prioritising grades over deeper learning at times- Disconnect between skills for exams and skills for being a good maths teacher. Importance of pedagogical content knowledge - Value of strong mathematical knowledge combined with teaching expertise - Those very skilled in maths may struggle to teach it effectively - Those who overcame struggles can better relate to students' difficulties.

In summary: The central tension seems to be navigating the path between nurturing conceptual understanding through engaging teaching approaches, and also adequately preparing students for qualifications and assessments. Effective maths instruction requires balancing depth and flexibility while still accounting for exam requirements. Strong pedagogical content knowledge emerges as key.

8)
Main Themes: Emphasising Career Relevance and Real-World Applications - Plans to focus lessons on how maths relates to future careers/jobs - Did a unit on budgeting for desired lifestyles which resonated with students - Believes making maths relevant is key to engagement and motivation. Negative Perceptions of Maths and Maths Teachers - Acknowledges maths and maths teachers are often viewed negatively - Even their athletic appearance/style didn't align with stereotypical "geeky" maths teacher - However, has a good collaborative relationship with sports department staff. Challenges of Student Attitudes and Low Expectations - Many students don't see the relevance of maths or value in passing - Low expectations - content if they scrape by with a Grade 4 - Don't appreciate the bigger picture importance until needing it for a job. Need for a Unified, Cohesive Approach - Believes everyone (students, staff, admin) needs to be "on the same side" - Things like timetabling issues undermine efforts in the classroom - An environment/setup centred around maths could provide more identity/focus. Valuing Practical Classroom Accommodations - Appreciates finally having their own dedicated maths classroom - Envisions colleges

structured more like high schools with subject buildings- Allows students to easily find the maths area for class and support. Developing with More Experience - Didn't realise how challenging maths teaching would be initially - Continues to learn and reflect on what works year-over-year - Recognises they still has more skills and experience to gain. **In Summary:** Key themes involve making maths relevant to counter negative perceptions, struggling with student apathy/low expectations, the need for a more cohesive college-wide approach that prioritises maths, utilising a dedicated maths area/environment, and ongoing development to gain more experience each year.
9) **Main Themes:** Lack of Institutional Support and Understanding - participant felt a severe lack of support in transitioning to teaching maths - their innovative student-centred approaches were not valued by colleagues - The institution seemed more concerned with bureaucracy than quality teaching. Toxic Work Environment and Bullying - participant experienced outright bullying and hostility from established team members - This extended to unfair grading of their coursework and personal insults - The negative environment took a major toll on participants self-esteem and mental health 3. Dismissal of Student Voices – participant's habit of actively listening to students was criticised by others - There was a mentality that students "don't know anything" so their feedback didn't matter - Yet participants' students were the ones who advocated for keeping her. Valuing Exam Performance Over Learning - Some colleagues seemed focused solely on exam results as the motivation -participant wanted to inspire real engagement and "aha" moments of understanding - Prioritising scores over the learning process was antithetical to their approach. Lack of Teaching Autonomy - participant was essentially denied the freedom to teach in their effective style - Every element from grading to activities was micromanaged - There was no trust in their professional judgement as an educator. Dysfunctional Upper Management - Stories of mismanagement, pettiness, and obliviousness higher up - Lack of accountability and colleagues working at cross-purposes - An overall sense of a dysfunctional, even "bonkers" institutional culture. **In Summary:** The central themes revolve around participant's student-centred, innovative spirit being stifled and rejected within a toxic institutional culture. Their approach clashed with existing dogmas fixated on exam performance, while participant lacked autonomy or real support to properly develop as an educator. The stories reveal deep levels of dysfunction permeating the organisation.

10)
Main Themes: Fostering Student Responsibility and Ownership - Emphasis on getting students to take responsibility for their own learning - Having them be the "architects" of their education, not passive recipients - Stressing the effort and consistent practice required, like mastering any skill. Contextualising Mathematics Learning - Using analogies and examples students can relate to (sports, video games, etc.)- Helping them see how maths practice mirrors improving at familiar activities - Making the value and relevance of maths qualifications tangible. Addressing Past Negative Experiences - Acknowledging students' previous struggles and reasons for disengagement - The "postcard pedagogy" for sharing stories and realising shared experiences - Strategically unpacking where aversions to maths stem from. Building Community and Debunking Myths - Creating an environment where students don't feel alone in their difficulties - Dispelling notions that maths ability is an innate "gift" some simply don't have - Emphasising maths is a learnable skill, not based on heredity. Initial Weeks as Crucial for Buy-In - Those first few weeks are critical for fostering engagement and belief - Getting students to value the qualification and see its future impact - Determining who will attempt the November resit opportunity 6. Research-Backed and Evidence-Informed - Approaches grounded in works like National Numeracy, Mashed Maths resources Referencing educational researchers like Dylan Wiliam - Continually seeking out and integrating effective pedagogical strategies.

In Summary: The central themes revolve around participant's multifaceted efforts to get students to embrace ownership of their maths learning journeys from the very start. This involves contextualising maths practice, directly addressing past negative experiences, fostering a supportive community, and dispelling myths about innate maths ability. The initial weeks are seen as a critical window for achieving student buy-in through research-backed strategies.

Domain 4: Subject Knowledge & Subject Curriculum.
Prompts: • What maths qualification is it that you teach? • What do you think makes teaching maths effective? • What are the challenges associated with teaching this qualification? • How do you develop your subject knowledge? • What training, mentoring or support have you had to support your role?
1) **Main Themes:** Teacher Training and Mentorship. Mimicked and copied mentor's practices. Close team that still connects. Shared Curriculum: Packs designed for each week's topics. Enabled coverage during absences. Assessment Factors: Data from various tools. Previous accomplishments may not reflect abilities. Vulnerable Learners: Mental health issues but high potential. Getting them through the door is an accomplishment. Built skills through qualifications. Critical mentor shaped approach. Shared Curriculum. Standardised materials and lessons. Allowed refinement and consistency. Assessment Considerations. Confirming accurate level placement. Managing unrealistic expectations. Supporting Vulnerable Learners. Building confidence and engagement. Progress over achievement. **In summary,** key themes show the participant built her teaching foundation from a close-knit team and strong mentor, allowing participant to later take a similar standardised curriculum approach. Assessment aims to confirm accurate level placements while focusing on progress with vulnerable learners facing anxieties around maths.
2) **Main Themes:** High expectations - Belief everyone can improve and pass - Not reflecting ability if fail exam - Focus on better maths skills - Planning factors: Consistent approach across vocations - Extra starter to identity gaps - Responsive content: - Verify and fill discrete gaps - Prepared for full lesson but adapt - Skills practice: Fix front-end paper issues - Combine different question sets. Barriers come from lower expectations - Planning considerations - Resource bank ready for flexibility - Structure and starter activities - Responsive content - Tailor lessons based on starters - Don't teach what's not needed -Skills practice - 16-day challenge of 1-markers - Promise it will stick after repetition. **In summary,** key themes cover maintaining high expectations that all students can improve, planning structured lessons but adapting content based on starter assessments, and providing targeted practice on weak skill areas. There is an underlying ethos of responsive, individualised teaching based on students' needs.
3) **Main Themes**: Shared curriculum - Teachers plan topics together - End of year review session. Divide up modules evenly - Quality Assurance: Opportunity to adjust allocation - Everything approved before use. Assessment Factors: Monitoring progression intervals. Balance teacher wellbeing - Team Cohesion: All contribute effectively now - Required nurturing and security. Tailor to strengths and preferences - Quality assurance - Standard lesson plan format - Review all content over summer - Assessment workload - More data without overburdening - Specific exam-related points - Building team cohesion - Safe to critique non-judgementally - Takes trust and relationships.

In summary, key themes relate to collaborative curriculum planning, standardising, and approving materials, obtaining progress data while considering teacher workload, and strengthening team relationships to enable safe critiquing, trust, and shared responsibilities.
4) **Main Themes:** Lower maths status - Lip service paid - Not an integral part Other areas take priority - Constant battle for parity - CPD challenges: Waste of money if unsupported - Staff dismiss non-compliant suggestions - CPD challenges - Ideas not implemented - Lacks follow through - Cultural barriers - Hard to change embedded behaviours - Scattered approach persists - Baseline with autonomy - Standard schema but flexibility in delivery - Differences need oversight- Cultural barriers: Resistant to new ways - Not managed effectively - Baseline with autonomy: Can't all do identical lessons - Progress still needs monitoring. **In summary**, key issues relate to maths not being seen as crucial within colleges, useless expensive CPD if suggestions around change are not actually enforced, persisting stubborn cultural behaviours that stifle improvement, but finding a balance between standardisation and professional independence within teaching approaches.
5) **Main Themes:** Varied qualifications - Taught full range - Functional skills to A-level - Range of boards - Exam differences: Syllabus aligned supposedly - Reality of grade thresholds - Attendance issues: Pulling teeth for exams - Crucial end stretch - Additional chances: Currently just two shots - Few ready that soon. Different awarding bodies - Exam differences - Boundaries and pass rates vary - Questions and formats too. Attendance issues - Hard getting them to all papers - November too early - Additional chances - Extra GCSE sittings needed - More time to consolidate. **In summary,** key tensions relate to the variation between awarding bodies despite common standards supposedly being set, ongoing challenges related to ensuring attendance specifically for exams, and constraints around having very limited GCSE exam opportunities for students needing more time to develop skills.
6) **Main Themes:** Developing Subject Knowledge and Pedagogy - Reviewing how learners approach concepts to understand their thinking - Observing and learning from other teachers' lessons - Collaborating with vocational teachers to connect maths concepts - Using engaging resources like videos, puzzles, challenges. Contextualising Maths for Engagement - Importance of making maths relevant and connected to vocational areas - Using analogies, real-world scenarios learners can relate to - "Going back to basics" not enough - need creative hooks to engage. Challenges in the FE Context - Learners' short attention spans, frequent breaks - Unmotivated attitudes, unwilling to engage with maths - Having to constantly re-energise and shift tactics. Organisational Support Limitations - Limited sustained training on embedding maths across the curriculum - Repetitive, not highly impactful training for maths teachers - Being set unrealistic target expectations despite challenges. Broader Responsibilities Detracting from Core Role - Administrative burdens and paperwork - Excessive time spent on safeguarding issues in meetings- Maths teaching itself becoming deprioritised and squeezed out. Establishing Core Foundations First - Getting to know learners and their backgrounds is crucial - Focusing on personal development before academic delivery - An extended "induction" period may be required before teaching content.

In Summary: The key themes revolve around the specific pedagogical requirements for engaging learners in maths within the FE setting, the various constraints and challenges faced, and the need to establish core foundations with students before meaningful maths instruction can occur. There are tensions between creative contextualisation for engagement.

7)
Main Themes: Pressures of assessment/qualification requirements - Government agenda for students to achieve minimum grades by age 19 - Cycle of repeated failure if targeted grades aren't met - Tension between exam preparation and deeper learning. Age and motivational considerations - older students become increasingly demotivated by lack of success over time - Need to balance ideal learning approaches with realities of their situation - Pragmatic view that exam qualification may be needed, even if not ideal. Role of vocational qualifications - Exploring alternative portfolio/project-based assessments - Embedding functional maths into vocational courses - Providing achievable stepping stones towards progression. Reflections on effective entry points - Importance of planning thoughtfully for new classes - Considering where students are starting from- Mapping out the journey to get them to desired endpoints.

In summary: The overarching theme is the pragmatic realities and tough balances inherent in adult maths education. While deeper conceptual learning may be ideal, there is acknowledgment that exam requirements and qualifications take precedence at times, especially for older students demotivated by past failures. This opens discussions around alternative assessments embedding maths in vocational routes as potential ways forward. Effective planning is seen as crucial in navigating these tensions productively.

8)
Main Themes: Prioritising Rapport and Safe Learning Environment - Spends significant effort getting to know students individually - Aims to create a "safe environment" where mistakes are okay - Stemming from his own personal experiences being afraid to be wrong - Part of supporting student wellbeing and retention. Balancing Exam Preparation and Conceptual Understanding - Wants students to enjoy maths and see its relevance to life - But also recognises need to prepare them for exams - Uses past exam questions extensively for "exam readiness" - Tries to build confidence by connecting procedures to concepts. Value of Varied Explanations and Openness - Believes there are multiple valid ways to approach concepts - Seeks out alternative explanations from colleagues and students - Open-minded to learning new strategies and representations - Reflects an appreciation for different perspectives. Challenges with One-on-One Time Constraints - Recognises individual rapport is ideal but time-consuming - With larger classes, has to be more informal/natural about it - Not always much actual class time for personalised interactions. Support through Collaboration and Planning - Frequently collaborates with and learns from other teachers - Spends significant time thoroughly planning and preparing lessons - Sees this as crucial for developing strong subject mastery. Consideration of Exam Boards/Curricula - Some discussion of potentially changing exam boards - Values the utility of past exam question banks - But has limited strong preferences as a newer teacher.

In Summary: Key themes involve a student-centred approach that prioritises community-building and conceptual understanding, balanced against pragmatic exam preparation. Varied explanatory methods and constantly enhancing subject mastery through collaboration and open-mindedness, despite facing constraints on personalised attention. Overall, an empathetic, growth-oriented stance focused on holistic student support.

9)
Main Themes: 1. Embracing Inquiry and Divergent Thinking - participant advocates posing open-ended, philosophical questions to spark curiosity - Using examples like "What is a rainbow?" to inspire deeper exploration - Connecting concepts to art, nature, and interdisciplinary applications Moving Beyond Exam-Focused Instruction - Critiquing an overly narrow focus just on exam questions/preparation - Seeing value in creative prompts that allow multiple valid perspectives - Using something like a bicycle to organically integrate maths, physics, etc. Advocating for Conceptual Understanding - Importance of truly understanding underlying processes and "workings" - Not just rote procedures or "magic trick" style instruction - Making maths tangible and visualisable through real-world examples. Institutional Resistance to Progressive Approaches – participant's innovative ideas were dismissed as "geeky" or "snobbish" - efforts at research and writing curricula were not valued - A rigid hostility toward diverging from traditional, exam-centric methods. Barriers to Professional Development - Requests for funding or support to enhance pedagogy were denied - No enabling of continued growth as an educator - expertise and experience were underappreciated by the institution.

In Summary: The central tension is between participant's student-centred, conceptually rich philosophical approach to making maths engaging and accessible, and an institutional culture fixated narrowly on exam performance using traditional methods. Their efforts at progressive, interdisciplinary curricula faced active resistance rather than being nurtured. Unlocking students' curiosity and understanding was devalued compared to strict test preparation.

10)
Main Theme: Prioritising Foundational Skills and Fundamentals - Emphasises thoroughly reinforcing basics like number sense, arithmetic operations - Spending the first term strengthening recall of prerequisite knowledge - Seeing gaps in core maths facts and procedures as a root issue for many students. Efficient Progression Through a "Mastery" Approach - By solidifying arithmetic and procedural foundations first - More advanced topics and problem-solving become more efficient later - Avoids having to continuously reteach missing prerequisite skills. Strategic Use of Technology and Mathematical Tools - Importance of students properly utilising tools like calculators, protractors, etc. - Many struggle due to lack of practice measuring and using geometry tools - Compounded by remote learning lapses during COVID restrictions. Holistic Skill building vs Teaching to the Test - Cautions against solely teaching to predicted test topics or awarding bodies - Advocates a balanced approach addressing conceptual gaps, techniques, tools - Knowing the fundamentals required by the chief examiner reports. Reasonable Expectations and Benchmarks - Recognising students don't need 100% mastery for Grade 4/5 - Providing self-assessment tools to track incremental progress - Giving students concrete evidence of growth to sustain motivation. Moving Beyond Content Repetition - Avoiding just reteaching the same material students previously failed to learn - Taking a true "revision year" approach by thoroughly addressing shortcomings - Not just retreading the same unsuccessful instructional approaches.

In Summary: The core themes involve strategically building up from solidifying foundational skills before efficiently progressing to more advanced content. This "mastery" approach centred on maths facts, procedures, and tools aims to comprehensively address gaps - moving beyond just retreading the same unsuccessful curriculum cycle. Self-assessment, reasonable benchmarks, and efficient integration of technology also emerge as key priorities.

Domain 5: Assessment
Prompts: • Thinking about assessment, what are the main considerations to make in the classroom? • What are the challenges of in relation to assessment, with your learners? • Are you aware of the national priorities in relation to maths teaching and learning? • Do you feel maths teaching and learning is related to the wider society/ national needs? • What do you think the perception of maths/ maths teachers is within the organisation/ society?
1) **Main Themes:** Purpose and Relevance of Maths Assessments - Questionable alignment to real-world needs - Teaching content not used in actual nursing jobs - Could tailor to management duties. National Priorities- Unrealistic expectations and timeframes - Exacerbates issues for struggling groups. Teacher Issues - Very few specialist maths graduates - Deficits in adaptive teaching approaches. Embedding Skills - Other subjects don't stress importance - - Needed for all routes (jobs, university etc.) Tick box exercise vs recognising existing skills. National Maths Education Priorities - One-size-fits-all approach won't work - Lacks awareness of barriers and anxieties. Teacher Recruitment and Retention Issues - - Low pay compared to other sectors - Need both strong content knowledge and pedagogy. Embedding Literacy and Numeracy - Resistance from other subject areas- Vital for funding, prospects, and promotions. **In summary,** key tensions emerge around relevance of assessments, problems with blanket maths education policies, teacher workforce issues around recruitment, retention and adaptive skills, and challenges getting institution-wide buy-in for literacy and numeracy.
2) **Main Themes**: Assessment challenges - Diagnostics provide limited data - Data not useful enough to inform planning - Test full topic not one discrete element - Building Relationships: Allow processing and resilience building - Assess via conversations initially. Training Impact: Very thorough compared to common offers - Focused on barriers and maths histories. Fundamentals: Debating the origins of numbers. Sparse prior exposure for some. Don't reflect all component skills - Relationship building - Cruel to test too soon after poor results - Must connect before assessing gaps - Valuable subject training - Transformative prior qualification - Made a much better teacher - Embedding fundamentals - surprising students with basic history - Core principles they take for granted. **In summary**, key tensions emerge around assessment timing and value, balancing data needs with emotional needs, the deep impact of high-quality maths-specific training, and curiosity-building around elementals students overlook.
3) **There is not enough content in this excerpt to make a meaningful theme.**
4) **Main Themes:** Tracking progress, surprised by limited data capture, small bites not overwhelming, Difficulty Pitching: Results not cleanly tied to thresholds, stretch vs overwhelm decisions, Purpose/Relevance: Maths itself or readiness testing? Rationale seems unclear. Added Oct/Feb

tests, End of lesson exam questions. Pitching difficulty, Hard to match grades, Risk seems unattainable, Purpose and relevance, Entry requirements? Measure of maths ability? **In summary,** key themes relate to boosting assessment points to better gauge progress, challenges accurately mapping question levels to grades, and some uncertainty around the purpose and mandate of the GCSE exams specifically. Additional tensions centre around providing achievable stepping stones to build confidence vs setting unrealistic expectations that may deflate morale.
5) **Main Themes:** Limited exam chances - Only two shots - Year-long resits drag - Demotivating if small progress - Earlier modular: Multiple assessment options - Celebrate smaller milestones - Instability and inequality: Schools cherry picked focus groups - Random mixed bags emerging - Relevance hitting later: Now the main priority - Maths gatekeeping their goals Gap too long if fail - Earlier modular exams - Broke content into chunks - More prepared and engaged - Instability and inequality - Inconsistent teaching in lockdowns - Grade inflation obscured reality - Relevance hitting later - Promotion/job barriers trigger return - Regretting not trying harder. **In summary,** key tensions relate to limited exam opportunities, benefits of having modular assessments, variability in educational experiences affecting baseline abilities, and maths often not being seen as crucial until encountering later roadblocks to personal progress.
6) **There is not enough content in this excerpt to make a meaningful theme.**
7) **Main Themes:** Limitations of standardised test scores - Test scores are a snapshot that don't fully capture a student's abilities - Over-reliance on single test results is problematic - Need for more holistic and ongoing assessment. Importance of formative assessment - Value of assessment for learning through observation, discussion - Getting to know students as learners beyond just test data - Using varied assessment approaches to build a fuller picture. Balancing teacher judgement and standardised tests - Teacher assessment should be a core component, not just exam performance - But need for robust moderation processes across institutions - Exams can validate and corroborate teacher assessments. Exam stress and negative impacts - Physical exam environments can be highly stressful for some students - Importance of catering assessment settings to individual needs - Questioning the inherent pressures of "exam factory" approaches. Student wellbeing considerations - Potential parental over-focus on exam scores over holistic development - Risks of defining students solely by test performance on a given day - Need for empathy about external factors impacting assessment readiness. **In Summary:** The central tension is between standardised tests being mandated and their perceived limitations, versus more individualised, formative assessment approaches that may better support student wellbeing and achievement. Striking the right balance through combining methods, with a core role for robust teacher judgement, emerges as an ideal but challenging paradigm.
8) **Main Themes:** The Culture of Maths Insecurity - There is a pervasive attitude of "I can't do maths" that seems socially accepted - Students, parents, other teachers often vocalise their inabilities with maths - This creates a dynamic where maths ability is seen as someone else's

problem - It removes accountability and devalues the importance of maths competency. Double Standards in Subject Expertise - The notion of openly admitting inability would be unthinkable in other subjects - For maths, there is a weird dynamic where non-maths teachers still dictate expectations - This contradictory attitude toward maths expertise is uniquely prevalent. The Inherent Challenges of Mathematics - Maths is viewed as uniquely difficult compared to other subjects - Its specialised nature means outsiders can't easily step in and teach it - There is an understanding that teaching maths well requires specific skills. Prioritisation of Maths in Curriculum - Despite being a mandatory component, maths is often deprioritised or sidelined - The vocational curriculum area takes precedence over maths/English academically - There is a misalignment between policy requirements and actual prioritisation. Maths as a Gatekeeper for Employment/Qualifications - In the modern workforce, maths qualifications are essential requirements - This amplifies the importance of focusing on maths in education - Yet this importance is not reflected in the attitudes and prioritisation on ground.

In Summary: The central tension seems to be the disconnect between the recognised challenges and specialised expertise required for maths competency, and the widespread insecurity, reprioritisation, and blasé attitudes toward maths inadequacy. There are inherent contradictions in how maths is regarded compared to behavioural expectations around other subject areas.

9)
Main Themes: Promoting Curiosity and Engagement - Participant values fostering a sense of curiosity and enthusiasm in students - Activities that spark interest and get students actively participating - Allowing students to ask thought-provoking questions the teacher may not know. Demystifying Maths and Embracing Struggle - Moving away from maths being seen as inaccessible "magic tricks" - Normalising that teachers don't have all the answers and can struggle too - Using those struggles as productive learning opportunities. Making Maths Tangible and Visual - Utilising concrete examples, analogies, manipulatives to make maths tangible - Helping students visualise and connect mathematical concepts - Activities like colouring to facilitate spatial/visual understanding. Valuing Process and Logical Reasoning - Appreciation for the logical step-by-step nature of algebraic reasoning - Having students articulate and follow each step consciously - The satisfaction of methodically working through and verifying correctness. Contextualising Maths Through Real-World Applications - Using relatable prompts like social media brain teasers to illustrate algebra - Showing how maths appears in everyday scenarios like shopping - Connecting maths to students' interests and experiences outside the classroom. Rejecting Rigid, Exam-Centric Instruction - Frustration with overly narrow curricular focus just on exam preparation - Resistance to formulaic "teaching to the test" devoid of rich learning experiences - Desire for freedom to innovate and contextualise maths education.

In Summary: The central themes involve participants' strong beliefs in engaging students' intrinsic curiosity, making mathematical reasoning tangible and transparent, and presenting maths as a logical process applicable to real life situations rather than abstract formulas. This contrasts with more rigid, exam-driven pedagogical models that promote a disconnect between students and authentic mathematical thinking.

10)
Main Themes: Balancing Initial Diagnostic Assessment and Meaningful Instruction - Using targeted basic skills tests to quickly identify gaps and prerequisite needs - But avoiding overemphasis on logging data vs. actually addressing gaps - Initial weeks about building

number sense, not excessive assessment. Reducing Maths Anxiety Through Low-Stakes Practice - Having students do practice exercises on their own, like "busy on the bus" activities - Allowing them to work at their own pace without shared scoring/embarrassment - Recognising the impact of prior negative experiences and test stress. Challenges of Onerous Data Tracking and Administrative Duties - Laments the extreme requirements around recording data, homework tracking, etc. - Sees it as a major distraction from actually planning and delivering instruction - Advocates more judicious use of periodic interim assessments instead. Need for Professional Autonomy and Curriculum Ownership - Importance of teachers having autonomy in curriculum delivery - Difficulty motivating teachers to deeply implement prescriptive pacing guides - Value of teachers co-developing curriculum to instil ownership. Importance of Subject Integration and Vocational Collaboration - Embedding maths teaching within vocational departments is highly effective - But requires strong relationships and mutual understanding of curricula - Providing cross-training for vocational staff can facilitate better integration. Constraints of Mixed Strategy Classrooms - Challenge of properly contextualising when students come from diverse programs - Limitations in fully integrating meaningful vocational examples - Potential lack of shared understanding between teacher and students' fields.

In Summary: The core themes revolve around strategic diagnostic assessment and guided practice to reduce maths anxiety, balanced against the burdens of excessive data tracking. Curriculum autonomy, ownership and integration with vocational areas emerge as ideal but difficult conditions to implement consistently. Overall, it highlights the tensions between research-backed best practices and institutional constraints.

Domain 6: Additional/ Suggestions to Improve Maths Teaching & Learning
Prompts: • What is the reality like of teaching maths (from your perspective)? Are you happy in this role? • What brings you joy in your T&L learning • What are the biggest successes and challenges of teaching maths? • Is there anything that you are doing that you would like to share with others? • What do you think should be done to improve maths teaching and learning – locally/ nationally?
1) **Main Themes:** Making Maths More Accessible, Enjoyable, attainable, less complex - Get more women into maths - Rewarding Aspects - Removing maths anxiety - Student gratitude years later. **Barriers: -** Reasons for dwindling supply unclear - Pressures worse in schools. Solutions: Flexible teacher training models, Tap transferable skills. Challenge negative perceptions - Rewarding Aspects of Teaching - Student breakthrough moments - Long-term student trajectories - Recruitment and Retention Barriers - Pay, stress, workload issues - Lack of specialist maths teachers. **Potential Solutions -** Bursaries and financial incentives - Recognise maths in other degrees. **In summary,** key themes relate to demystifying math to reduce barriers, appreciating rewarding aspects with long-term student impacts, exploring retention issues, and potential policy and recruitment solutions including new teacher training pathways.
2) **Main Themes:** Increasing teacher supply - Shortage needs addressing urgently. Current staff lack energy for demands. Class Sizes. Learners hide when rooms are packed - Pair work more feasible. Phone Distractions: Box confiscation system - Compulsion for some. Sharing Approaches: Holistic not short-term focus. Most teachers very passionate. Tap related disciplines with maths. Attract young university graduates. Smaller class sizes - Maximum of 18 students - Enables individual support - Removing distractions - Ban mobile phones - Constant urge to check impacts of learning - Sharing effective practices - Mastery approach across department - Target front-end paper weaknesses. **In summary,** key issues focus on the need for more secondary maths specialists entering FE teaching, reduced class sizes to enable support, eliminating mobile distractions, and spreading mastery techniques to achieve lasting impact. The participant conveyed a high level of dedication and care across most existing team members.
3) **Main Themes:** Improving maths teaching - smaller class sizes - Mastery approaches - Supporting teachers - Increased pay - More planning/reflection time - Burdens and biases - Heavy workloads overlooked - "Cushy" perception still lingers - Meeting all needs - Inclusion responsibilities pile up - Pressures not always recognised. De-stigmatise manipulatives - Bring back proven techniques - Supporting Teachers: Holidays less than assumed - Vital contributions undervalued - Burdens and Biases: Administrative tasks accumulate - Public oblivious to realities - Meeting Needs: Funding dependent on this - uneven coordination creates additional stress.

In summary, key issues relate to enhancing pedagogical maths approaches, lack of recompense and time for teacher development, workload burdens combined with lingering misconceptions, and strains meeting expanding learner needs with finite resources.
4) **Main Themes:** Reduced class sizes, Manageable numbers like 18, enables personalised time, more support staff, lessen administrative tasks, allow focus on teaching, cross-sector collaboration, share ideas between colleges and schools, counter insular thinking, alternative qualification, GCSE label doesn't fit 16-19s, Functional skills too advanced. Quality feedback impossible currently - 2 minutes per student not enough. Support staff: Chasing registers etc. Frees to plan and mark properly. Collaboration: Regional networks lacking. Different techniques to try. Alternative qualification: Life skills content more relevant. Avoid disengaging further. **In summary,** suggestions centre on smaller classes to facilitate 1-to-1-time, additional administration support so teachers can focus on pedagogy, increased partnerships between local education providers to exchange best practices, and consideration of a distinct qualification better suited to 16-19 resit students.
5) **Main Themes:** Sharing resources - Openness varies greatly - Some still resistant - Reduces individual burdens. Networking: Platform to exchange tips - Build confidence and insight - Prep demands: Respond to evolving standards - Materials stock takes ages. Post-16 model: Multiple exam chances - Less pressure all on one day. Shouldn't be proprietary - Network opportunities - Time to showcase ideas - Learn techniques from others -Prep demands underestimated - People unaware of workload - Constantly keeping content fresh - post-16 model change - Modular assessments -Portfolio credits effort. **In summary,** suggestions centre on having more collaborative opportunities to exchange best practices and resources between maths teachers, finding ways to convey heavy unseen workplace demands to outsiders, and reforming qualifications for 16–19-year-old resit students via coursework credits and modular exam components.
6) **Main Themes:** Concerns about extending compulsory maths education - Questions around teaching maths to students over 18 - Doubts about how it would work in practice - Need to tackle maths education from a young age. Lack of people training to be maths teachers - Declining numbers applying for maths teacher training - Perception that maths teaching is too stressful - Pay and conditions not attractive enough. Challenges with government maths policies - Disconnect between rhetoric and reality on the ground - Funding rules restrict what courses can be offered - Policies don't adequately recognise learning difficulties. Teachers' biggest successes and joys - Seeing learners achieve and progress despite difficulties - Sparking interest in students who were disengaged - Alumni getting desired jobs or further education places. Mentoring as a powerful development tool. - Kept the teacher on their toes and encouraged reflection - Provided extra pair of eyes and collaborative improvement - Contrasted with judgemental formal observations. Need to put learners at heart of the work - Focusing on supporting learners vs management demands - Accepting you can't control everything as a teacher - Remembering learner progress is the real reward. Changes needed in maths education - Embedding maths skills from a much younger age- Alternative courses to meet needs of lower-level learners- More truly inclusive pathways that enable all to progress.

In summary, the main themes relate to concerns about maths policy implementation, difficulties attracting new maths teachers, the power of mentoring and focusing on learners, and the need for more flexible and inclusive maths pathways. The teacher seems passionate about meeting learners' needs but frustrated by the systemic barriers and lack of support to do so effectively.
7) **Main Themes:** Joy and fulfilment in classroom teaching - found greatest satisfaction teaching students directly - Seeing learners develop mathematical thinking and understanding - Realising true calling was being a practitioner in the classroom. Impact from the classroom - Belief that teachers can have profound impact leading from their classroom - "Leader without stripes" - you don't need a position to be influential - The classroom itself should shine, not just outward processes/structures. 3. Prioritising teaching and learners over administrative duties - Importance of staying focused on the core work with students - Avoiding getting too distracted by external responsibilities - Keeping out of the "staffroom" and centred on one's learners. Continued identity as an educator -still a "teacher at heart" even in retirement - The drive to discuss education, learning, and teaching remains- Viewing oneself fundamentally as a teacher role. Appreciation for the dialogue - Gratitude expressed by both for the enriching conversation - Value in being able to reflect on one's journey and experiences - Opportunity to impart perspective from accumulated wisdom **In Summary:** The central themes revolve around the profound meaning and impact derived from direct classroom teaching interactions with learners. There is a strong conviction that teachers' greatest influence emanates from prioritising those core instructional moments over other duties. Identity remains anchored in the teaching vocation and drive to discuss educational matters.
8) Main Themes: The Realities of Post-Pandemic Teaching - Challenges with student behaviour and engagement after being remote - Need to be more innovative and creative to re-engage students - Having to adapt pedagogy to this "new normal". Investment in Student Success - Importance of truly getting to know students as individuals - Going above and beyond to build relationships and rapport- clear investment in planning thoroughly for student learning. Successes in Student Transformations - Joy in witnessing "light bulb" moments of understanding - Examples of students overcoming embarrassment to enjoy maths - Positive changes in previously struggling/disengaged groups. 4. Developing as a Reflective Practitioner - Participant recognises they are always learning and growing - Open to diverse explanation methods, not just one approach - Willingness to critically examine their own practices. Valuing a Student-Centred, Safe Environment - Emphasis on creating an environment where mistakes are okay - Not singling students out or embarrassing them - Prioritising student wellbeing and confidence-building. Greater Prioritisation of Maths at a Systemic Level - Need to instil the importance of maths qualifications from an early age - Maths skills are crucial for employment and promotions - But this importance is not adequately reinforced nationally. **In Summary:** The core themes revolve around experiences successfully re-engaging student's post-pandemic through employing creative, student-centred approaches that build trust and community. This is balanced by his ongoing development mindset and desire for maths to be given greater systemic priority. Overall, there is a palpable level of investment in holistic student success and transformation.

9)
Main Themes: Promoting Creativity and Interdisciplinary Connections - Participant advocates for integrating art, philosophy, and humanities into STEM education - Using creative works like The Queen's Gambit to explore themes like cognition and perception - Making connections across disciplines to inspire curiosity and deeper thinking. Embracing Open-Ended Inquiry and Discovery - Valuing opportunities for true open-ended exploration without constraints - Allowing discussions and lessons to organically extend based on student engagement - Removing artificial "barriers" like rigid time restrictions that limit learning. Immersive and Experiential Learning - Discussing technologies like 360° projection rooms for highly immersive lessons - The ability to virtually explore subjects from the micro to cosmic scale - Transporting students into experiences that "stick in their minds". Living in the Present Moment - Drawing insights from philosophy on the human perception of time - Appreciating the significance of being fully present rather than rushing - Contrasting this present-focused approach with education's typical frantic pacing. Aspiration vs. Reality in Education - Frustration when innovative ideas and aspirational visions clash with reality - Recounting stories of rigid bureaucracy and unsupportive administrative cultures- The sense of education being subsumed by superficial optics and ego over substance. Justifying Pedagogical Approaches - The need to be able to clearly articulate and justify one's instructional choices - Avoiding superficial judgments from outsiders removed from actual practice - Having the freedom for substantive innovation when it can be rationalised.

In Summary: The central thrust involves participant's passion for creative, experiential, cross-disciplinary education that transcends artificial constraints. However, this idealistic vision often clashed with a reality of rigid bureaucracy, narrow viewpoints, and institutions prioritising optics over true learning. The ability to properly justify and be supported in innovative pedagogy emerges as both a major challenge and imperative.

10)
Main themes: Addressing Recruitment and Staffing Challenges - Cites recruitment of quality post-16 maths instructors as a major issue - Many providers struggling to properly staff classes, resulting in oversized groups - Need for specialised training on teaching this distinct age group. Improving Teacher Training Opportunities - While some free training exists, more is needed to build an adequate instructor pool - Challenges arising from teachers being improperly prepared for FE setting - Highlights own efforts at widespread teacher training across the country. Attendance and Engagement Obstacles - Consistent attendance emerges as another significant hurdle to overcome - Difficulty getting students to remain engaged throughout the full course - Ties into larger issues around student mindsets and buy-in. Prioritising Learning Over Institutional Factors - Laments decisions being driven by financial constraints over student outcomes - Some colleges settle for not being the worst rather than pushing for excellence - Short-term financial considerations superseding pedagogical best practices. Standardisation vs Teaching Philosophies - Pushes back on notion that switching awarding bodies makes a major difference - Sees it as a futile exercise if curriculum and instruction remain unchanged - All awarding bodies aiming for comparable standards and rigor. Facilitative Learning Environments for Assessments - Contrasts examples of accommodating assessments in classroom settings - Reducing anxiety and creating a familiar, comfortable testing environment - Costly but valuable in giving students their best chance at success.

In Summary: The central themes revolve around systemic challenges like staffing shortages, inconsistent attendance, and institutional financial priorities crowding out a focus on pedagogy and student mastery. This is coupled with criticism of awarding body shopping and

a lack of autonomy for instructors. Overall, a call for renewed investment in specialised training and learning-centred decision making.