In what ways and to what extent can a bespoke programme of support enable primary teachers to develop as teacher educators of their peers?

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Abstract

Each year NCETM runs many work groups in England, funded by the Department for Education, all of which are organised on the basis of a cascade effect: two teachers attend work group meetings then share their learning with their colleagues. Evidence shows that although work groups change the teaching of those who attend meetings, the cascade to colleagues is less effective.

The work was carried out in two stages through joint work group meetings and bespoke school visits. An initial reconnaissance stage was designed to provide a baseline from which development could be measured and to inform the design of the intervention. The second stage was designed to address a range of teacher education strategies, with the content to be determined in collaboration with the group members. However due to lockdown this work was incomplete. A proxy was therefore used to establish the ways and extent to which participants were acting, and felt confident to act, as teacher educators of their peers, despite the restrictions caused by lockdown.

The reconnaissance phase showed that teachers started with a wide range of prior experience of leading teacher education. Closing questionnaires showed that participants had increased in confidence to act as teacher educators of their peers. Follow up interviews with a representative sample of participants found all were now showing evidence of thinking and acting as teacher educators of their peers. However, none showed evidence of identifying themselves as such, leading to the conclusion that identity change occurs after changes in behaviour are embedded.

Respondents were asked to identify the factors which had the greatest influence on their development as peer teacher educators. A wide range of responses to this question led to the conclusion that due to the differing prior experience and contexts within which participants

worked, two key factors were the variety of teacher education strategies considered in this intervention and the bespoke support the programme offered. An expectation of professional experimentation, with participants feeling supported to enact and reflect upon new ideas was also important in their development, as was modelling of high-quality teacher education.

As lockdown prevented full implementation of this study, care must be taken when generalizing from these findings. However, they add to the knowledge base of effective ways to cascade learning between work group members and their colleagues. They will be further developed in the coming academic year.

In what ways and to what extent can a bespoke programme of support enable primary teachers to develop as teacher educators of their peers?

1. Introduction and Rationale

Each year NCETM provides high quality, Government funded, mathematics professional development to serving teachers, through the running of work groups, delivered through a nationwide network of maths hubs across England. This research project sought to equip two groups of participants to share their learning with their colleagues.

Work groups are locally organised and delivered, following a nationally agreed framework. Each work group will meet several times during an academic year, with gap tasks set between sessions to support group members to implement new ideas in their own classroom practice so that their learning becomes embedded. Each of the participants is then expected to share their learning with their colleagues in school, effectively acting as teacher educators of their peers, using the resources from the work group meeting which are shared for this purpose, thus achieving a whole school impact. This project was carried out in order to explore ways of enhancing the "cascade" effect which is a core part of all NCETM work groups, yet both published reports and anecdotal evidence suggest is currently a less effective aspect of the programmes.

The work group plan for each work group is explicit in that in addition to professional learning for the participants and changes in their teaching and/or leadership practice, change in policies and approaches will also take place across the whole school. There is a specific objective to ensure professional development practices are in place so that the cycle of change can be implemented. (Appendix 1 – Mastery Readiness Work Group Plan showing intended

outcomes.) The national evaluation of the Mastery Readiness programme for 2018-2019 found:

> 'Through analysis of Work Group plans and summative reports, and observation of workshops, it was evident subject knowledge development was embedded through the programme and was well received by participants, particularly where modelling was used. In the participant survey, all respondents strongly agreed or agreed that modelling of practice by the MRL was useful. A key theme from participant reports was that subject knowledge enhancement on the four operations was highly valued.' (NCETM Lead Evaluator Report NCP118-10 final)

However, it has been noticed at both a local and national level that although the work groups are very effective at changing the knowledge and practice of group members, the cascade effect across the whole school is less effective. Last summer, two Head Teachers from different areas (whose schools I had not worked with) told me that although they released two teachers to attend work group meetings for a year, they saw little impact across the whole school so they were wondering what the point of the meetings had been.

This is reflected in the NCETM Lead Evaluator Report (2019):

> 'In the summative report, 95% of respondents reported to have disseminated learning from the Work Group. However, the level of subsequent change varied between schools.'

National training for Mastery Readiness work group leaders carried out in January 2020 recognised the inconsistency in the impact of the programme across the whole of participating schools, with a section of the day devoted to exploring ways that group leaders could facilitate professional development in the schools with which they worked.

Materials for work group leaders are very much focussed on embedding change in the practice of the members of the group. There is an implicit assumption that if slides and other resources are shared with group members, they will be able to use these resources to effectively facilitate the leadership of change across their schools. However, little or no attention is given to equipping the group members to do this effectively. It is assumed that

they will be able to take the resources they are given and use them to deliver teacher education which has a positive impact on classroom practice. In my professional experience, this often results in a hard-pressed classroom teacher (who has little time available to prepare to lead a staff meeting), attempting to deliver in an hour material they covered over a whole morning in a work group meeting.

Consideration of this background led to this research project being undertaken to explore ways in which the members in two Mastery Readiness work groups in the academic year 2019-2020 could be supported to share their learning more widely with their colleagues in order to increase the whole school impact, thus becoming teacher educators of their peers. Therefore, this research and development project's overarching question is:

In what ways and to what extent can a bespoke programme of support enable primary school teachers to develop as teacher educators of their peers?

It has the following sub questions:

- What understanding of teacher education do participants hold at the start of the programme?
- What elements of the programme do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?
- In what ways and to what extent do the participants now view themselves as teacher educators of their peers, as evidenced by behaviours and confidence to act?

2. Literature Review

2.1 Context

In order to examine the literature relating to the growth of primary teachers as teacher educators of their peers, it is necessary first to consider the context within which they work.

For many years, English primary schools have operated a system in which all class teachers with QTS are responsible for the leadership of one or more National Curriculum subjects. The nature of this role varies widely between schools, but it is an additional area of responsibility to be carried out at the same time as teaching a class, often with very limited time out of the classroom to carry out the role. In 1988 the Teacher Training Agency introduced a set of standards for subject leadership, which made it clear that subject leaders were responsible for maintaining and promoting high standards in the teaching of their subjects. Hammersley-Fletcher (2002) explored the range of activities carried out by subject leaders as part of their roles and identified that the majority of time spent on subject leadership was providing resources for colleagues. Staff training took the smallest proportion of subject leaders' time and although time spent influencing practice was significant in the autumn term, it diminished significantly throughout the year. Lunn & Bishop (2002) explored the tension experienced by teachers as they tried to balance the competing demands of their roles as class teachers and leaders of their peers, both because of the time constraints caused by teaching a full timetable (thus making it very difficult to observe or support colleagues in their classrooms) and also the difficulties teachers experienced in giving lesson feedback to their peers. These tensions continue today.

The 1988 subject leadership standards were issued to schools as non-statutory guidance and they have not subsequently been updated. The only guidance currently available to inform subject leaders about their roles can be found in the 2019 Ofsted school inspection handbook:

189. The following activities will provide inspectors with evidence about the schools' implementation of its intended curriculum:

- Discussions with curriculum and subject leaders and teachers about the programme of study that classes are following for particular subjects or topics, the intended end points towards which those pupils are working, and their view of how those pupils are progressing through the curriculum
- Discussions with subject specialists and leaders about the content and pedagogical content knowledge of teachers, and what is done to support them
- Reviews of schemes of work or other long-term planning (in whatever form subject leaders normally use them), usually in discussion with curriculum leaders

(Ofsted, 2019a)

It can therefore be seen that there is a considerable amount of pressure placed upon subject leaders to have a detailed understanding of their subject across the school, regardless of the subject leader's level of knowledge or teaching experience. Although schools allocate subject leadership roles in line with teachers' interests, experience and qualifications as far as they can, this is not always possible, particularly in a small school where one teacher leads several subjects. Changes introduced since the election of the coalition Government in 2010 have largely led to the removal of the Local Authority advisers previously available to support schools and subject leaders. It is therefore not unusual for the maths lead in a primary school to have no maths qualification beyond GCSE and to have not received any training in maths specific pedagogical approaches since their initial teacher education, nor any specialist support with subject leadership. The participants in this study came with the very broad range of prior experience and expertise usual in such a work group. The importance of this is discussed further in section 2.3.1 below. Appendix 2 outlines the roles and contexts of the participants.

2.2 What does it mean to be a teacher educator?

As the purpose of this research project was to explore the ways and extent to which teachers could be supported to develop as teacher educators of their peers, it is necessary to first establish what is effective teacher education? I will then consider the knowledge, skills and understanding required to deliver effective teacher education (section 2.2.2).

2.2.1 What is effective teacher education?

The widely established link between the quality of teaching and pupil outcomes (Wiliam, 2016), (Ofsted, 2006), (The Sutton Trust, 2011) has led to teacher education being widely researched. For the purposes of this study, I will focus my review primarily on literature relating to the development of in-service teachers.

14 years ago, Ofsted (2006) found arrangements for Continuing Professional Development (CPD) in schools in which they carried out subject inspections were inadequate in around one third of English primary schools. Pedder & Opfer (2011) concluded that 'teachers' professional learning in England is generally ineffective and lacks school-level systems and supports.' (p741) More recently, in the Executive Summary to their report on effective teacher professional development, Darling-Hammond et al. (2017) state that 'research has shown that many PD initiatives appear ineffective in supporting changes in teacher practices and student learning.' (pV) There is therefore a clear need to identify factors which lead to effective professional development, or education, for serving teachers.

Pedder & Opfer (2011) in their large scale national study commissioned by the Training and Development Agency for Schools in England, found that 67% of teacher CPD activities reflected more passive forms of learning, such as listening to a lecture or presentation. Only 17% of respondents reported taking part in practicing the use of pupil materials, 9% more extended problem solving and 6% demonstrating a lesson, unit or skill. No competent English primary school teacher would attempt to educate their pupils in this way: their initial teacher education and classroom experience has taught them that pupils learn best when they can put their learning into practice, so why is this not applied to teacher education?

Pedder and Opfer (2011) also go on to suggest forms of CPD which are considered by head teachers to be good quality and effective, including classroom-based experimentation, working collaboratively with others and making links between published research and in-

school practice. Bubb & Earley(2009) list a wide range of activities on offer in the schools they studied, such as individual reading, research and reflection; observing and working with peers within school; participating in cross school networks and drawing on external expertise, however they conclude that 'staff development that involve discussing, coaching, mentoring, observing and developing others is highly effective' (p25). A wide range of approaches and strategies are drawn on in schools to support the professional development of their teachers, but as Higgins et al. (2015) state, no one teacher activity was universally effective to bring about teacher learning: 'teachers needed variety, and the ability to explore approaches from multiple angles.' (p8)

Teacher education is more than just a series of activities – the context within which those activities are set and the way in which they are sequenced is also important. Higgins et al (2015), in their meta-analysis of nearly one thousand international reviews into effective professional development, identified a clear set of elements which are found in professional development opportunities which have a significant impact on student development:

- The duration and rhythm of effective support.
- The consideration of participants' needs.
- Alignment of professional development processes, content and activities.
- The content of effective professional development.
- Activities associated with effective professional development.
- The role of external providers and specialists.
- Collaboration and peer learning.
- Leadership around professional development. (p10)

These findings are echoed in the Ofsted overview of research supporting the current inspection framework (Ofsted, 2019b).

The teacher educator therefore will first consider the needs of their participants (and their pupils). They will then consider the range of strategies available to them and the way in which these activities can be sequenced. The decisions they make will be informed by their knowledge base as a teacher educator.

2.3 The teacher educator knowledge base

In this section, I will explore the key literature relating to the teacher educator knowledge base in two main areas. Firstly, how teachers learn, considering the implications for the knowledge base of teacher educators and secondly, the role of the teacher educator in drawing this knowledge together to provide teacher education.

2.3.1 How do teachers learn?

What does the literature say about teacher learning and the ways in which teacher educators can draw on this as they seek to provide professional development for the teachers with whom they work?

Practical experimentation

In their interconnected model of teacher development, Clarke & Hollingsworth (2002) suggest that teacher learning occurs as a result of change in any of the following connected domains: personal, practical, consequence or external. A stimulus in one of the domains leads to a sequence of enacting new ideas or information, then reflecting upon the outcomes of that enactment. Connections between the domains mean that reflection upon change in one will lead to change in others. Particularly relevant in this context is their assertion that it is not sufficient to provide new information: if it is not put into practice through professional experimentation, the learner will not develop as a teacher. Therefore, the teacher educator must be aware of the importance of practical experimentation and so ensure the learning opportunities they provide allow for this. It is also not sufficient simply to act – for change to occur, actions must be reflected upon.

Teachers' learning is not limited to taught professional development sessions. Leikin and Zazkis (2007) stress the importance of classroom experience in teacher development. Interactions with teaching materials and student responses in lessons provide important

information for a teacher to draw upon in their quest to develop their craft. As teachers grow in classroom experience, they will compare their experiences to their prior knowledge or learning and start to develop their own theories about what works for them, with their pupils, in their context. McIntyre (1995) described this as practical theorising: the process by which ideas from different sources are critically tested rather than simply being accepted. The greater the level of a teacher's prior experience and knowledge, the more connections they will be able to form between new and established learning, thus making it easier to retain knowledge. Stanovich (1986) named this the Matthew Effect: "For to everyone who has, more will be given." (Matthew 25:29). The more you know, the easier it is to learn.

If learning is to occur, teachers need to have the opportunity to integrate the new theories and ideas they are learning with their already-held theoretical knowledge and practical experience. It is also important to allow time for a change to take place between what Schon (1983) describes as knowing-in-action (the instinctive, actions taken by the experienced teacher, for which they are often unable to articulate a reason) to knowledge-in-action (being able to explain the reasons for choices made both before and during teaching). The teacher educator must be aware of the importance of this in the learning process.

Beliefs

It is widely recognised that a teacher's beliefs about mathematics, teaching and learning have an important influence on their classroom behaviour. Given the importance of practical experimentation in teacher learning, the teacher educator needs to be aware of the way that a teacher's beliefs will influence their practice. Korthagen (2004) describes the factors influencing a teacher as being like an onion. The inner layers of mission, identity and beliefs, which cannot be seen, will determine what can be seen in the outer layers: competencies, behaviour and environment.

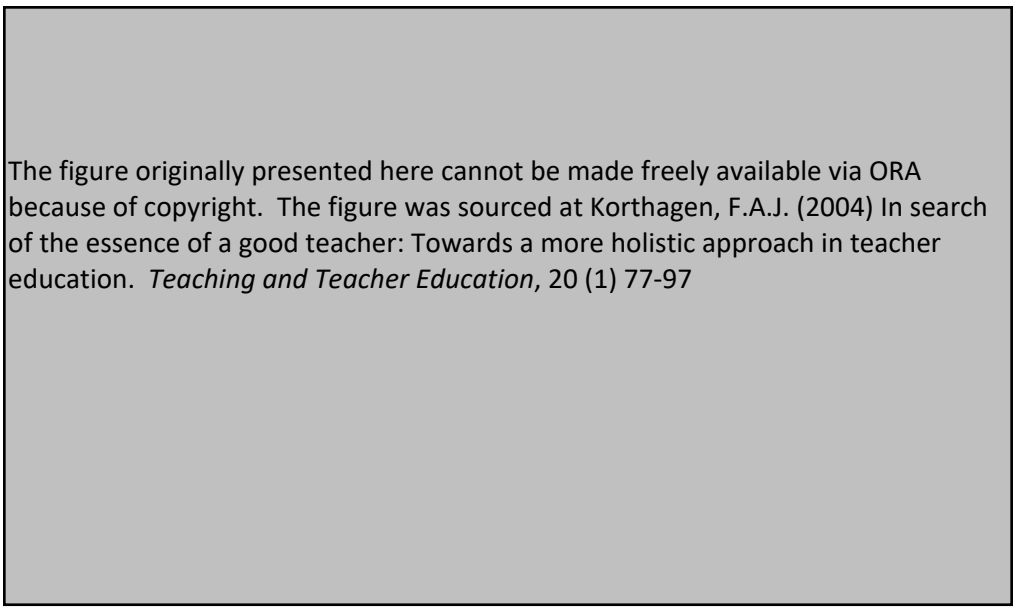


Figure 1: Korthagen's onion model

In order for the teacher educator to effect change in a teacher, it is often necessary to examine the inner beliefs which inform outer behaviours. Beliefs, whether tacit or openly espoused, determine classroom behaviour. Thompson concurs with this view when he states: 'teachers' beliefs, views, and preferences about mathematics and its teaching, regardless of whether they are consciously or unconsciously held, play a significant, albeit subtle, role in shaping the teachers' characteristic patterns of instructional behaviour.' (Thompson, 1984, p105)

It is also important for the teacher educator to know the beliefs, or orientation towards teaching, which lead to the most effective mathematics teaching. Askew et al. (1997) identified three distinct approaches to teaching maths: transmission, connectionist and discovery. Their research established that teachers with predominantly connectionist beliefs were most likely to be highly effective. Swan (2006) explored these ideas further in a two-year study of 64 teachers. His analysis of his work to support teachers to move to a more connectionist orientation clearly showed the benefit of this approach. A teacher educator will need to consider the beliefs held by those they are working with and, where necessary, be prepared to prompt belief change.

Novice and expert learners

Berliner (2004) identified distinct stages in teacher development, from beginner to expert, resulting from increasing classroom experience. Wiliam (2016) concurs, suggesting that although the time taken to become expert will vary between people and areas of expertise, 'it takes ten years of practice to develop expertise in a given area.' (p138) My professional experience has shown me that as teachers grow in experience, their learning changes. At the start of their teaching career, a teacher's attention will be pre-occupied with issues of organisation and classroom management however, as they gain experience, these cease to be such a concern and the teacher becomes able to notice and reflect upon other aspects of teaching, therefore novice and expert teachers learn differently. My research project was concerned with the development of experienced classroom teachers as peer teacher educators. The participants not only came to the project themselves with a wide range of prior experience, but would be working with colleagues with an equally diverse range of prior experience so is it is important for them to be aware of the difference that experience makes to learning.

Context

The context in which a teacher works will also impact on their ability to learn. Ernest (1989) explains that context plays an important role in the way a teacher conducts their classroom behaviour. Scribner (1999) outlines a wide range of school-level factors which influence teacher learning, suggesting that contextual factors are equally weighted with learning activities and motivational factors in their influence on teacher learning.

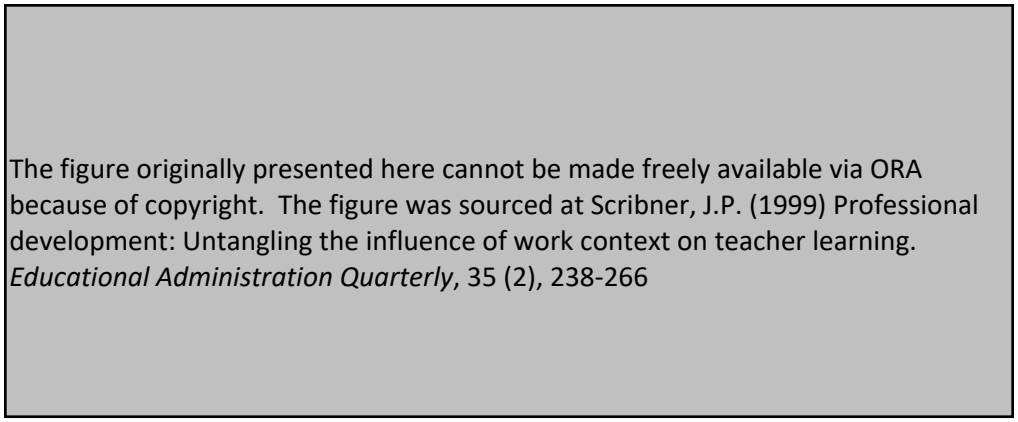


Figure 2: Factors influencing teacher learning (Scribner, 1999 p259)

Clarke & Hollingsworth (2002) also recognise the importance of context, which they describe as the change environment, as it can impact professional growth at each stage of the teacher learning process.

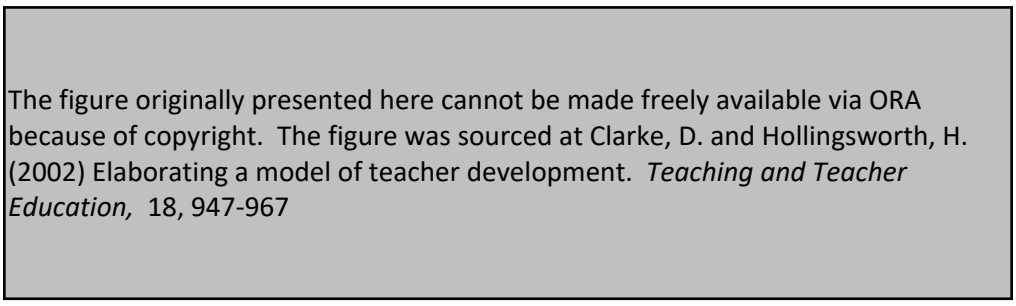


Figure 3: Influence of the school context (Clarke & Hollingsworth, 2002 p963)

It is therefore important for the teacher educator to be as aware of the context within which their learners work, as they are of participants' prior experience and baseline knowledge.

Therefore this work suggests that a teacher educator must take into account all of these factors when planning teacher education opportunities. Having considered the ways that teachers learn, I will now examine the literature relating to the range of opportunities and strategies available to provide teacher learning. How can this knowledge be most effectively enacted?

2.3.2 The role of the teacher educator

Having considered the knowledge required of teachers and the ways in which teachers learn, I will now outline the literature relating to the provision of teacher learning and the role of the teacher educator within this. How can teacher educators best provide opportunities for learning to take place?

Collaborative learning

Cordingley et al. (2020) stress the importance of collaboration in developing teacher learning. Ways in which professionals can work together to collectively develop their practice have been studied and conceptualised in different ways since Lave & Wenger (1991) introduced the idea of communities of practice: professionals at different stages of the same career working alongside each other to share expertise and develop the practice of less experienced members. Jaworksi (2005) developed their ideas further when she described a community of inquiry 'in which existing practices are questioned and alternative practices explored.' (102-3) She views a community of inquiry as more than a community of practice, with the difference being the emphasis on inquiry into practice in order to improve practice rather than simply replicating that of the most experienced members. Stoll et al. (1995) describe the way in which a professional learning community can be developed to build capacity within schools to promote pupil learning. They suggest professional learning communities have five characteristics: shared values and vision, collective responsibility, reflective professional inquiry, collaboration, and promoting both group and individual learning.

Each of these conceptions of learning community differs slightly but the core purpose for each is the same: to provide learning opportunities and develop the practice of the members.

The importance of being part of a community of practice and reflecting on teaching, both individually and with others (Zaslavsky & Leikin, 2003) is outlined within mathematics teacher

education literature. It also features within literature relating to beginning teacher educators more generally, for example in the International Handbook of Teacher Education (2016), where Hamilton et al. (2016) stress the importance of participating in a supportive learning community, stating that beginning teacher educators found this invaluable.

The participants in the two groups under consideration in this research project came together for a defined period of time, to work together to develop their practice both as classroom practitioners and as school leaders, including as teacher educators of their peers. Although they came from different workplaces and only met in person a few times, the characteristics listed above of both a community of inquiry and professional learning community could be seen in the way they interacted. As the work group leader, I was aware of the importance of establishing an ethos of mutual support and encouragement within the group so that members felt safe and supported to experiment professionally. This aligns with Stoll et al's recognition of the importance of mutual trust, respect and support among members.

As collaboration and sharing experiences are powerful strategies in facilitating teacher learning (Darling-Hammond et al., 2017), it is important for the teacher educator to facilitate opportunities for teachers to work together to reflect on and develop their practice collaboratively. The teacher educator must also consider carefully the ways in which an ethos of shared growth, working together to create a shared learning community, or co-learning partnership (Jaworski, 2001) can be developed. Just as the relationship between teacher and pupils is key, so is the relationship between teacher educator and teachers. (Loughran, 2007a)

It is also important to consider the importance of individual learning as well as working as a group. Just as a classroom teacher would differentiate for their pupils, providing 1:1 support when needed, the participants in this study came from a range of contexts with a range of starting points, so it was also necessary to address the learning needs of individuals. Clarke & Hollingsworth (2002) state that change in one domain can lead to change in any of the other

three domains, and the order in which this happens is dependent on the individual. This allows for personalisation of learning to take account of what they describe as a 'professional learning style.' (p962) They state that '…professional development programs should be deliberately designed to offer participants the opportunity to enact change in a variety of forms and change sequences consistent with individual inclinations.' (p962)

Sequencing learning opportunities

It is widely acknowledged that one-off, stand along learning sessions are less effective than those which form part of a planned sequence of learning. For example, in 2019 Ofsted (2019b) stated that effective professional development takes place over time, within longer programmes and lasting at least two terms if it is to have an impact. They also stressed the importance of follow up: as you would with pupils, revisiting prior learning and offering follow-up, practice and support. In their review of effective professional development, Higgins et al. (2015) also stress the importance of learning taking place over time, reinforced with opportunities for classroom experimentation and consolidation being built into a rhythm of activities, support and follow-up activities.

Within a sequence of learning opportunities provided by a teacher educator, it is important to allow time for the process of connection between prior and new learning and experiences to occur (McIntyre, 1995), both within and between teacher education sessions. It is also important to provide teachers with space for reflection to enable connections to be formed, and then the opportunities to discuss their developing understanding with others in order to facilitate the move from knowing-in-action to knowledge-in-action (Schon, 1983). Cordingley et al. (2020) emphasise the importance of teacher education opportunities being aligned to the development needs of the participants: '... an essential element of successful CPDL is overt relevance of content to its participants and their day-to-day experiences and aspirations for

pupils.' (p5) If content is not relevant, participants will be unable to make connections or to reflect on their learning, aligning it to their prior experience.

The need for teachers to be presented with opportunities to integrate theory and practice has long been a challenge in teacher education (Burn & Mutton, 2015): if an important part of the learning process is building connections between prior practical experience and theoretical understandings with new ideas and theories, then the teacher educator must carefully consider the way learning will be sequenced to enable this to happen. One approach to address the challenge of bringing theory and practice together to facilitate teacher learning is the Realistic Teacher Education approach outlined by Korthagen & Kessels (1999) in which theory is introduced when practical experience makes this relevant. Whether working with pre-service or in-service teachers, this approach can present practical difficulties as each participant will be ready for theoretical learning at different times. However, Burn & Mutton (2015) conclude that teacher education programmes that adopt a research-informed, enquiry-oriented approach are rated most highly by teachers. A strong theoretical underpinning for teacher learning has also been found to be a key characteristic of provision that has greatest impact on student outcomes. Cordingley et al (2020) stress the importance of the integration of theory and practice when they recommend that the content of CPDL should be: 'based on appropriate specialist expertise and evidence related to both teaching and learning and its content and on a sound theory of action.' (p11)

Choices about programme content

Teaching is complex, with many different factors influencing the decisions made by a teacher in the classroom. The literature suggests that for meaningful learning to take place, all participants require a shared experience on which to build their discussion and shared reflection. (Loughran, 2007a) Representations of practice have long been used as a tool in teacher education to provide this shared experience. Therefore, the teacher educator will

need to choose from the many resources (including videos, sample student work, scenarios, pupil tasks and activities or textbooks) available to them to build this shared experience. Rowland et al.'s (2005) category of transformation knowledge (within the Knowledge Quartet they developed for use with primary maths teachers) is as important a skill in the toolkit of teacher educators as it is for the teacher. Buchbinder & Kuntze (2018) explore factors influencing the choice of representation of practice to use with learner teachers and note that teacher responses to representations of practice differ depending on the context in which they work and their prior teaching experiences. Therefore their research suggests that the deeper the knowledge the teacher educator has of their learners, the more informed their choice of representation of practice will be.

If a teacher educator is to influence wider change, it is also beneficial for them to have an understanding of change management. Clarke & Hollingsworth (2002) note that 'Researchers such as Fullan (1982) recognized that many professional development programs fail to consider the process of teacher change.' (p949) Cordingley et al (2020) stress the importance of situating CPDL within the wider priorities of a school: professional learning does not take place in isolation. The Eight Step Change Model introduced by Kotter (2007) is one example, as is the guidance report published by the Education Endowment Foundation on Putting Evidence to Work. (Education Endowment Fund, 2019) Although not directly linked to teacher learning, an understanding of models of change management will assist the teacher educator in making decisions about the content and sequencing of the teacher education they provide.

Modelling

One of the key strategies available to any educator is the modelling of desired practice. Just as the classroom teacher will model approaches to solving a mathematical problem, the teacher educator can model desired teaching strategies or ways of working. As Korthagen & Lunenberg (2004), in (Loughran, 2007a) say, 'teach as you preach.' (pp94). It has long been

recognised that many teachers default to teaching as they were taught: Lunenberg at al. (2007) suggest modelling by a teacher educator is a powerful way of overcoming this and introducing new practice, yet it is often an overlooked approach. Modelling in this way will provide opportunities for teachers to reflect on the pedagogical purpose of activities, as they will experience first-hand the impact on learners.

When working with teachers to develop their practice as teacher educators of their peers it is important to think further than programme content: the manner of delivery is a powerful strategy to utilise in leading professional development.

Reflection

The Clarke & Hollingsworth model of teacher development (2002) referred to above places great emphasis on the importance of reflection. Without reflection, they argue that learning will remain shallow and transient. It is through the process of reflecting on practice (Schon, 1983) that a teacher makes the connections necessary for change to occur and to be retained. Swan (2011) stresses the importance of individuals having the opportunity to 'doubt, reflect and reconstruct in unhurried, safe environments.' (p57). He suggests that the purpose of the teacher educator is to offer opportunities to teachers to behave differently so that they can reflect on those opportunities and thus adapt their belief. It is therefore important for the teacher educator to provide space for both individual and shared reflection as an integral part of the teacher learning opportunities they provide. Opportunities for reflection rarely occur in the busy day of an English primary school teacher, so building reflection time into a professional education programme will prompt the start of change sequences which lead to growth networks. (Clarke & Hollingsworth, 2002)

Reflection upon teaching will also support the process of developing as a teacher educator (Zaslavsky & Leikin, 2003), so it is beneficial to both the teacher educator and the teachers with whom they work to model good practice in reflection. It cannot be assumed that

developing teachers will know what is meant by reflection, nor that they will see the value in reflection unless it is explicitly modelled. For reflection to take place, it is first necessary to have something to reflect upon, defined by (Loughran, 2007a) as a problem (this could be a classroom situation or event). One problem can be seen from multiple perspectives: Schon (1983) describes a process of framing and reframing, as a way of viewing and then changing the way we view a problem. Barnes (1982, in Loughran (2007)) explains that frames are 'the default settings we carry with us that set up the expectation we have of a situation.' (p96). The teacher educator therefore can support teachers to reframe situations or problems, to see them from a different point of view. This will then make available to the teacher different ways of dealing with that situation when it is encountered in the future.

If the teacher educator is to facilitate professional reflection, it may also be beneficial for them to be aware of approaches that can be adopted to allow for this, along with potential issues that may arise. Schon (1983) introduces a distinction between reflection-in-action (the in the moment, contingent decisions that are made whilst in the flow of teaching) and reflection-on-action (careful consideration after an event of what could have been done differently and identifying positives from the situation). Beauchamp & Thomas (2009) urge the importance of reflection taking place within an understanding of the context in which it is set, taking account of the experience of participants. Again, the literature supports the importance of teacher educators developing their knowledge of the teachers with whom they work and Loughran's emphasis on teaching as a relationship (2007a) supports this.

Summary

One of the aims of this research project was to establish the elements of support provided to prospective teacher educators which made the greatest impact on their developing practice. In this section therefore I have considered the elements which combine together to form the knowledge base of teacher educators: the knowledge required of teachers, how teachers learn

and the role of the teacher educator in developing the professional practice of those with whom they work, in order to provide a framework against which the responses of participants can be assessed.

2.4 Identity formation and change: becoming a teacher educator

The purpose of this research project was to support teachers to develop as teacher educators of their peers, so I will now consider the literature relating to identity formation and change, particularly in relation to teachers becoming teacher educators.

Identity has long been studied from many different perspectives, including philosophical, psychological, developmental, sociocultural and post-structural. There is general agreement that identity is hard to clearly define, with authors in different fields offering slightly different interpretations. Gee (2017) defines identity as 'being recognised as a certain "kind of person," in a given context…' (p99). In the context of teaching and teacher education, Davey (2013) defined identity as 'the valued professional self.' (p31) There is agreement that one's identity is formed as a result of interaction with others and is influenced by the extent to which one feels affinity with a particular group. There is also agreement that identity is fluid, flexible and ever-changing in response to the situation one finds oneself in. (Rogers & Scott, (2008) in Davey, (2013))

Gee (2017) describes four ways to view identity, three of which are relevant to this study: institutional identity (assigned by authority, for example relating to a position or role); discursive identity (developed in response to dialogue or relationships with others) and affinity identity (relating to membership of a group, for example being a member of a community of learners). By joining the work groups in which this study was situated, participants were offered the opportunity to adapt each of these views of their own professional identity.

As Gee's work argues, individuals hold multiple sub-identities (with some being a more dominant facet of an individual's understanding of self than others). It is important for teacher wellbeing that these sub-identities are in harmony, however Beijaard et al. (2004) conclude that conflict between sub-identities occurs for experienced teachers in times of change. The teachers in this study were being asked to change their professional identity to add teacher educator to their existing sub-identities, so it was likely that they would, to a greater or lesser extent, experience discomfort as they were challenged to add to their existing identities as primary school teachers. They were invited to move from a position of expert classroom teacher to novice teacher educator, a process recognised by Murray & Male (2005) to be stressful because of the internal conflict experienced during the move.

The length of time taken to move from identifying as a teacher to teacher educator has been widely researched. Beauchamp & Thomas (2009) state that a teacher's identity changes over time, with a range of factors influencing the shift; Loughran (2011) agrees that adopting an identity as teacher educator is a gradual process, as do Goodwin & Kosnik, (2013) who explain that becoming a teacher educator is a process that takes place over time. Murray & Male (2005) suggest this process takes two to three years and that professional confidence is a key indicator that the new identity of teacher educator has been adopted. Hamilton et al. (2016) conclude that there is no point at which a teacher educator identity solidifies: it is an ongoing process of becoming. As my research study to develop teachers as teacher educators of their peers took place over six months, it is unlikely that they would fully adopt the new sub-identity of peer teacher educator, therefore evidence of behaviour as teacher educators was sought. If the participants were behaving and interacting with their peers in the role of teacher educator, they would experience the interactions with their colleagues necessary to start the process of identity formation and change.

There is also agreement on the importance of reflection and space in the process of becoming a teacher educator. Identities are reshaped over time. Tzur (2001) stresses the importance of reflection, or self-study, in the development of the teacher educator as self-study enables private theory (described by McIntyre, (1995) as practical theorising) to become public in order that it is shared with others. Loughran (2011) concurs. The growing body of literature on self-study in teacher educator development (Berry & Loughran, 2002), (Loughran, 2007b), (Tzur, 2001) greatly enhances our understanding of how the professional identity of the teacher educator is formed.

Summary

This literature review has discussed the published research relating to the development of teacher educators. The required knowledge (of teachers and of teacher learning) has been considered, along with ways of enacting that knowledge, in order to support my research into the elements of my programme participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers. I then discussed the literature relating to the formation of teacher educator identities, in order to assess the extent to which my participants viewed themselves as teacher educators of their peers.

3. Methodology

This research project was designed to answer the research question: "In what ways and to what extent can a bespoke programme of support enable primary teachers to develop as teacher educators of their peers?" In order to do this, three subsidiary research questions were identified:

- What understanding of teacher education do participants hold at the start of the programme?
- What elements of the programme do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?
- In what ways and to what extent do the participants now view themselves as teacher educators of their peers, as evidenced by behaviours and confidence to act?

For each research question in turn I will outline the intervention design and then the data collection and analysis which was carried out to answer the question. I will also address the ethical issues considered in the design, implementation and analysis of this research project. However, as a key element in this intervention was the bespoke nature of the support provided, it is relevant to first consider the participants, their backgrounds and their teaching contexts.

3.1 Participants

24 participants, who were all members of two NCETM Mastery Readiness groups, consented to take part in this research. During two work group meetings, when each group was together, this research and development project was explained and an information sheet circulated. Participants were given the opportunity to ask questions about the project and it was made clear that there was no compulsion to participate: choosing not to take part would not in any way be detrimental to the group members.

Participants entered the intervention with a wide range of prior experience: the group included an HLTA, two NQTs and several senior leaders. 14 participants were their schools' Maths Leads and so middle leaders. They worked in five different types of schools: infant, junior, primary, first (serving up to year 4) and all through (3-18). The schools were situated in widely differing areas from inner city to rural, and the majority had above the average number of pupils from disadvantaged backgrounds. In order to be eligible for the Mastery Readiness programme, all schools were identified as facing additional challenges in developing their maths teaching, for example a high level of pupil or staff turnover or an Ofsted grading of 3 or 4. Details of the participants can be found in Appendix 2.

This was a diverse group of teachers and stage theory (Berliner, 2004) identifies the different ways in which teachers learn at different stages of their careers. Clarke and Hollingsworth (2002) also suggest that the context in which a teacher works is significant in influencing their professional development. Therefore, a consideration of both participants' wide range of prior experience and contexts was important in the design and implementation of this intervention.

3.2 Timeline of activity

As this research project was situated within a wider programme of work with the participants and the COVID-19 lockdown caused significant changes to be made to the planned intervention, table 1 below gives a timeline for the complete project, including initial preparatory work. This research project started in January 2020.

October 2019	Initial preparatory work Commence work with two Mastery Readiness work groups (meetings in October and December. Initial focus developing participants' classroom practice and subject leadership - not teacher education. Had planned to introduce research project at December meeting but couldn't as CUREC approval not received, despite submitting in October)
Late January 2020	Project commenced Explanation of research project; consent obtained from participants; opening questionnaire First teacher education strategy introduced: what makes an effective CPD session? Participants then worked together to plan a CPD session to deliver to their colleagues
March 2020	Lockdown Many participants had not had time to lead the CPD session they had planned Meeting at which feedback on implementation of January gap task would have been discussed was cancelled Face to face work with the group stopped
Weeks commencing 11 and 18 May 2020	On-line CPD sessions 2 weeks of on-line CPD to which all participants and all of their colleagues were invited. Focus on teaching strategies (watch a lesson video and come prepared to discuss aspects of pedagogy) 3 phase specific sessions each week, each session held twice at different times to maximise attendance. 12 sessions in total
18 & 19 June 2020	Final group meeting on-line Final on-line work group meetings at which teacher education was discussed. Only an hour long so limited input possible. At the meetings, participants were asked to list all the strategies they used to influence the behaviour of their peers. This list was then used to generate the strategies on the yes/maybe/no section of the closing questionnaire (how confident do you feel to....)
21 June 2020	Collection of closing data commenced Closing questionnaire sent after the final on-line meeting, based on responses in meeting
Week commencing 6 July 2020	1:1 Zoom interviews with 6 participants as data from the questionnaire was felt to be unreliable and to gather more detailed responses

Table 1: timeline of activity

3.3 What understanding of teacher education do participants hold at the start of the programme?

The research project commenced with a reconnaissance phase to establish participant understanding and experience of teacher education. This had two purposes.

Firstly, if participant development as teacher educators of their peers is to be identified and measured, it is necessary to establish the point from which they have started. Secondly, this project was designed to research the impact of a bespoke programme of support, tailored to meet the needs of participants as they developed as teacher educators. In order to enable the design and delivery of a bespoke intervention, it was necessary to establish participant understanding and experience of teacher education, both as a participant and as a teacher educator so the areas they had less experience in could form part of the bespoke programme. It was also necessary to understand the opportunities available to participants to act as teacher educators of their peers, and the conflicting priorities they faced within their schools, as this would influence their ability to develop as teacher educators of their peers.

Data collection

A baseline questionnaire was carried out with all participants (see Appendix 4), with questions designed to probe participant understanding and experience of teacher education (did they only recognise formal training as teacher education, or were they aware that other forms of professional development are equally valid?). It also sought to find out the extent to which participants had led different forms of teacher education in the previous year and to establish participant capacity to work with their peers to develop their teaching. A self-administered questionnaire was selected to gather this data as it was necessary to select a method which enabled data to be gathered from the groups of participants simultaneously in a time effective way. Cohen et al, (2018, p471) state that questionnaires are useful for 'collecting survey information, providing structured, often numerical data… and often comparatively

straightforward to analyse.' On this basis, a questionnaire containing open-ended questions was selected as it would provide sufficient information for the research project to proceed and could be supplemented with individual interviews if required for clarification (although none were required). The questionnaire was given to participants as soon as they had completed the consent form, at a face to face work group meeting in January.

Data analysis

Responses to the questionnaire were analysed numerically, identifying the number of participants supplying each answer, in order to identify patterns in responses. The original plan had been to administer the questionnaire in early December so that the data generated could be used to design the intervention: the identification of areas of teacher education in which participants had least experience would determine the starting point for the intervention. However, CUREC approval took almost three months so it was not possible to administer the questionnaire until January, so my professional judgement and experience of working with similar groups of teachers was used to decide that the intervention would start by addressing how to run a CPD session. Subsequent analysis of questionnaire responses supported this decision.

As the intervention progressed, decisions about further actions would be made in collaboration with the participants. This was to ensure the programme of support remained bespoke, responding to the experiences and needs of the participants.

3.4 What elements of the programme do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?

Participants were supported to develop as teacher educators of their peers in two distinct ways: joint work group meetings in which they collaborated with one another, and individual bespoke visits to schools. I will consider each of these in turn.

Work group meetings and professional experimentation

The work group meetings had a number of purposes related to the wider programme of NCETM Mastery Readiness groups: one of these was supporting participants to lead mathematics professional development in their schools. A development cycle was followed in which shared professional learning was delivered at a work group meeting, in which all participants learnt together. This was followed by implementation and experimentation in participants' schools. The next time participants met, their experiences were shared and reflected on together.

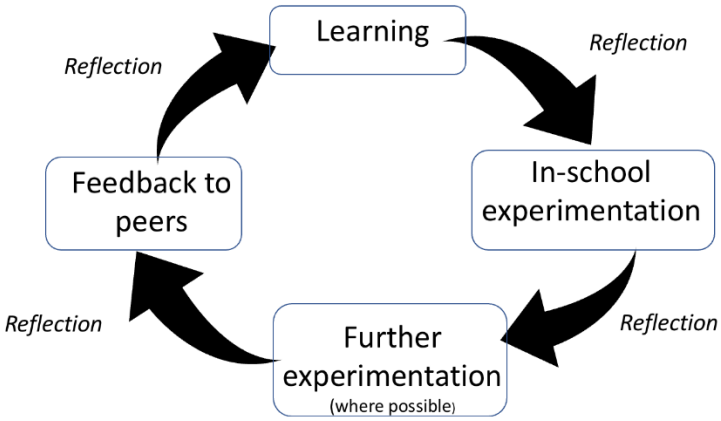


Figure 4: Development Cycle

This cycle of development was adapted from the Clarke & Hollingsworth (2002) interconnected model of teacher development for use in teacher educator development. It was designed to encourage participants to enact their learning from work group meetings and

then reflect on the outcomes. Sharing their experiences at subsequent meetings enabled successes to be celebrated, problems or barriers to be addressed, and prior learning to be revisited through listening to the experiences of others. It took account of the diversity of participants and enabled them to enact the strategies they felt to be most applicable to their context.

The first implementation of this cycle considered strategies for leading effective CPD. Subsequent cycles, had lockdown not intervened, were expected to have considered other strategies emerging from the questionnaire, namely to maximise the learning from demonstration lessons, ad-hoc conversations and shared planning. However, the intervention was designed to be developed in collaboration with participants, as a result of their teacher education experiences within their schools: as lockdown prevented this professional experimentation and collaborative development, an alternative approach was required. As the work group leader, I led on-line CPD sessions and participants were encouraged to invite colleagues to attend these sessions. Participants then had the opportunity to follow up on these sessions with their peers, enabling them to act as teacher educators.

Bespoke support visits

Additionally, each school received individual support visits every half term. This enabled the intervention to be highly targeted to meet the diverse needs of individual participants and schools. Work during bespoke visits varied, and was focused on meeting all the aims of the Mastery Readiness programme, not just that of ensuring "professional development practices are in place so that the cycle of change can be implemented" (see Appendix 1 – Work Group Plan). However, where relevant, time during bespoke visits was spent equipping participants to lead the education of their peers.

Adaptations to the intervention required due to COVID-19

The COVID-19 lockdown of schools prevented the full implementation of the cycle of learning as originally planned. A far narrower range of teacher education strategies was considered and opportunities to enact learning and share experiences were significantly curtailed. Had lockdown not intervened, the Mastery Readiness programme in which this research was situated would have concluded with group reflection and evaluation activities which would have provided data to answer this question. However, this could not take place so it was necessary to identify an alternative strategy to address my research question.

Although the online sessions were not directly designed to develop the participants as teacher educators I saw the opportunity to use the response to the sessions to gain some insights into participants' development as teacher educators, but much more obliquely. First, I hypothesised that if they had brought a colleague along this may well express an interest in developing that teacher. Secondly, the development of teachers' practice from online sessions may have been taken back into school and shared in professional development activities and so again might offer some insights into their development as teacher educators.

Data collection

It was decided to explore the ways and extent to which participants responded to the opportunity to invite their peers to attend the on-line sessions as an opportunity to indirectly gain insights into my key research question for this phase. Semi-structured participant interviews were conducted in order to 'acquire unique, non-standardized, personalised information…' (Cohen et al. 2018, p509) I wanted to explore whether the differences in contexts, backgrounds and prior experience of participants had caused them to respond to the intervention in different ways: semi-structured interviews allowed participants to speak at length about the elements of the programme which had made the greatest impact on them and so gather more individualised data.

In order to ensure participants selected for interview were a representative sample of those taking part in the intervention, the following process was followed.

Interviewee Selection

Of the original 26 participants, six were interviewed as this would balance the conflicting needs of obtaining as much information as possible whilst ensuring the process remained manageable. As I was exploring the hypothesis that participants who invited colleagues to attend the on-line CPD sessions were acting as teacher educators of their peers, I decided to use the proportion of staff from each school who attended the sessions as a selection tool, as this could indicate the ways and extent to which they had developed as peer educators.

There was a wide response to the online sessions, with several variables influencing the number of attendances from each school. Firstly, the schools varied in size, with the largest school having 16 classes and the smallest having just 5. Some schools encouraged support staff and senior leaders to attend whilst others only invited teachers. Schools also had varying numbers of staff due to job shares. Finally, some people attended multiple sessions whilst some only attended once. Using the raw data of the number of attendances from each school was therefore of little value. The number of attendances from each school was therefore calculated as a percentage of possible attendances (number of classes in the school multiplied by the number of sessions). This showed that the schools fell into three categories:

Group 1	3-6% attendance	3 schools
Group 2	17-26% attendance	6 schools
Group 3	52-71% attendance	5 schools

Table 2: allocation of schools to groups

It was important also to be aware that some school leaders did not wish the group members to invite their colleagues to attend online sessions as they were mindful of the pressure staff were under at the time and they did not wish to add to the expectations already placed upon them. Due to this entirely understandable guidance from their Head, some participants were prevented from being able to act as teacher educators of their peers at this time. These were the schools in group 1: they had no additional participation by colleagues, beyond the original work group members, and were therefore not included in further research.

Participants from three schools in group 2 and three schools in group 3 were selected to be interviewed. Comparing responses of the teachers from each group would generate information about the differences in the ways participants had acted, in order to draw conclusions for future teacher education work: what caused respondents to act differently and what elements of the intervention had the greatest impact on their development as teacher educators of their peers?

Areas explored in the interview

My key question for this phase was 'What elements of the programmes do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?' Interviewees were asked: What aspects of the MR programme have been most useful in developing your skills or ability or confidence to work with your peers to develop their practice? I then used spontaneous probes (Beatty & Willis in Cohen et al. (2018) p 514) to explore responses in more detail.

Interview process

Those participants selected for interview took part in standardised, open-ended interviews via Zoom. During these interviews they were asked the above open-ended question to identify the elements of the programme which they felt had had the greatest impact on equipping them to support the development of their peers. This method of data collection was selected as it enabled the researcher to probe answers more deeply and encourage respondents to give more detail about their answers, particularly the reasons why they chose to speak about specific activities and the impact on their development as teacher educators of their peers.

Data analysis

A grounded, inductive approach was then used to analyse responses, seeking to identify patterns and establish common themes in which elements of the programme were most often mentioned as having been most supportive in enabling them to act as teacher educators of their peers. It was decided to select this approach, rather than imposing a framework from literature, to enable the voices of the participants to be heard and then to bring in the literature to interrogate the findings.

First, responses were colour coded by participant in order to anonymise them. They were then split into bullet points, so that each distinct activity or idea mentioned could be considered separately. Participant responses were then grouped by question, thus enabling like answers to be drawn together and categories identified. The colour coding made it possible to see at a glance how many responses from each participant fell into each category identified, thus revealing the number of participants to whom a category was relevant. Table 3 below shows an example of answers categorised as general (not relating to specific activities), with colours replaced by respondent numbers for reprographic purposes.

Respondent 1	The mix of pedagogical theory and practical examples which can be implemented in the classroom

Respondent 1	The strong research base in sessions gave the reasons why change in teaching strategies is important. It was really helpful to have the reasons why, not just being told what to do
Respondent 2	Initially the sense of enthusiasm and inspiration to try new things. The first session was really timely as staff at my school were all exhausted from initiative fatigue.
Respondent 3	Group discussions about gap tasks were useful, even if not everything being talked about was applicable, because it prompted thinking
Respondent 3	3 ways is a clever day – making maths accessible for all children
Respondent 4	Listening to the feedback on gap tasks at the second session where everyone talked about what they had put into practice in school. It really highlighted their achievements and what they had already done, which built confidence to continue.

Table 3: example of responses from coding to category

3.5 In what ways and to what extent do the participants now view themselves as teacher educators of their peers, as evidenced by behaviours and confidence to act?

In the design of this research project, it was planned that at the end of the programme of support, participants would be invited to complete a closing questionnaire to reflect on and establish the extent to which they had acted as teacher educators during the intervention and to probe changes in the participants' view of themselves – did they now identify as a teacher educator of their peers? The questionnaire would be administered at the final group meeting, in the same way that the research project had started with the baseline questionnaire. This tool was selected as it would enable data to be gathered from all participants in a time effective way. Administering the questionnaire face to face would maximise the number of questionnaires completed, thus ensuring data was as complete as possible and removing the possibility of bias caused by questionnaires only being returned by those who had fully engaged with the intervention.

However, lockdown meant it was not possible for participants to enact their learning in the way originally planned as explained above so this research question was amended to probe participant confidence to act as well as actual behaviour. It was also not possible for the group to complete the questionnaire whilst meeting face to face. It was therefore necessary to design alternative methods of gathering data to answer this research question.

Data collection

Initially, a closing questionnaire was emailed to all 24 participants to ask them to identify teacher education activities they now felt **confident** to enact (as opposed to activities they had enacted). A list of different teacher education strategies was provided and participants asked to tick yes, maybe or no for each one to indicate whether they felt confident to enact that strategy. A deliberate methodological choice was made to include strategies which had not been covered during the intervention as well as those which had featured more prominently in order to provide a measure of validity in participant responses. Many participants ticked yes for each strategy, regardless of whether it had been addressed during the intervention. There are many possible reasons for this (desire to help the researcher, lack of understanding of what the strategy entails, high level of prior experience so confidence is appropriate), and the choice of a written questionnaire to gather this data meant it was not possible to probe responses more deeply.

Furthermore, only 15 participants returned the questionnaire, compared to all 24 when the questionnaire was administered in person at the start of the intervention. The questionnaire was circulated at the stage of lockdown when some year groups had returned to school so participants were facing an increased level of work and stress. Several apologies for the late or non-return of the questionnaire were received after analysis had been completed, so in the light of these external pressures a deliberate choice was made to reassure participants that their non-response was not an issue.

The information generated by this questionnaire was therefore judged to be of limited value as it was not felt it was an accurate representation of potential participant action. It was necessary to seek further data to provide evidence to answer this research question.

Alternative methods of data collection employed

The semi-structured interviews described above were also used to gather data relating to this research question.

Firstly, the interview focused specifically on interviewees' responses to the opportunity to invite colleagues to attend the sessions. What motivated participants to invite colleagues to attend? As stated before, this was intended to see if the invitation for colleagues to attend had some teacher education angle, thus demonstrating at least by proxy their developing role as a teacher educator. It was hypothesised that those participants who encouraged the greatest engagement from their colleagues were more likely to be acting as teacher educators of their peers.

Secondly, the interviewees were asked what, if any, follow up activities to the online sessions had they enacted with their colleagues? In this way, information was sought to assess the extent to which they were taking responsibility themselves for the education of their peers, as opposed to relying on the work group leader to provide this education on their behalf.

Analysis

Responses to these questions were analysed following the process outlined above.

3.6 Ethical considerations

This research was carried out in accordance with University of Oxford CUREC procedures which were agreed and authorised before the start of this intervention. The BERA Ethical Guidelines for Educational Research (2018) were also followed.

Informed Consent

As part of the application process to join the work group, the Headteacher of each participating school had signed to say they understood "it is expected that these two teachers have the opportunity to lead development across the whole school." (see Appendix 3 – Mastery Readiness Information for Applicants) The NCETM work group plan (see Appendix 1) is also very clear that one of the specific intended outcomes of the group is to develop teaching and/or leadership practice. It was therefore clear from the outset that group members would be supported to develop the practice of their peers.

All participants were given an information sheet about the research project and completed a consent form. They were also encouraged to share the information sheet with their Head teachers. In this way, all involved were made aware of the scope of the research and how further information about the research could be obtained, should they wish, including the right to withdraw at any time. This ensured transparency about all aspects of the project: the purpose was clearly explained to participants.

As the organisation promoting, facilitating and funding the Mastery Readiness groups, NCETM were also informed at both a local and national level. One of the national leaders of the Mastery Readiness programme was consulted about the project as the outcomes will have national significance: she has asked for a copy of findings so they can be considered for incorporation across England in the future.

Balance

However, developing classroom teaching in the participating schools was not the only aim or intended outcome of the work group: the content of meetings was driven by the work group plan and the expectations of NCETM, who fund the programme. It was therefore necessary to ensure that an appropriate balance was attained between activities which supported this research project and those which met the aims of the wider programme within which this project was situated.

Conflicting relationships

As the researcher was also the group leader, it was important to be aware of potential issues this dual role created. In order for the group to function optimally, close relationships were formed between the researcher and participants, as evidenced by some interview responses. When reviewing and analysing questionnaire answers, it was necessary to be conscious of the potential impact of these relationships on the responses given. It was also important for the group leader to be seen to not favour those participating more actively in the research project (for example, those selected for interview).

Implications of lockdown

The COVID-19 lockdown placed an immense amount of additional pressure on school leaders and teachers. During lockdown, work on the Mastery Readiness programme continued in a revised format, through the provision of sessions on Zoom. However, it was important to be sensitive to the contexts of individual participants and to not cause any additional stress during such a difficult period. It was also extremely important to be aware of the conflicting demands upon the time of participants when gathering data at the conclusion of this project. This led to the choice being made to not chase questionnaires which were not completed, so only 62% of closing questionnaires were returned, in comparison to 100% of opening

questionnaires. It also informed the data collection choices and quantity of information sought at the close of the research project.

4. Findings and Discussion

The purpose of this research was to explore the ways and extent to which a bespoke programme of support would enable primary teachers to develop as teacher educators of their peers. In order to answer this question, three subsidiary research questions were posed. I will consider my findings in relation to each of these questions in turn.

4.1 What understanding of teacher education do participants hold at the start of the programme?

Firstly, in order to assess any change in the extent to which participants viewed themselves as teacher educators of their peers, it was first necessary to ascertain their experience and understanding of teacher education for serving teachers. Did they simply view teacher education as formal CPD, provided through INSET days or staff meetings, or did they appreciate the range of activities which could comprise a wider understanding of the concept of teacher education?

A baseline questionnaire was completed at the start of the project, which asked 24 participants: "What forms of development have you experienced since January 2019 which were intended to improve your practice as a teacher?" 17 respondents described education opportunities beyond INSET or staff meetings, for example working with an external adviser or HMI to carry out a learning walk or shared planning sessions with colleagues. The remaining 7, including two NQTs and an HLTA, mentioned only adult-led CPD such as staff meetings or courses. It is not surprising that these participants' experience of teacher education is less broad than that of their more experienced peers.

The questionnaire then sought to establish the ways and extent to which participants had acted as teacher educators for their peers before the start of the programme by asking if they had ever given maths support to other teachers in their school: 19 participants gave examples

of ways they had worked with their colleagues in PPA time to discuss and plan lessons together, to mentor or coach colleagues or that they had given informal advice when sought by peers. The other 5 said they did not give maths support to colleagues.

Finally, participants were asked about any staff meetings or INSET sessions they had run for colleagues since January 2019. This made it possible to establish that in the two terms from January – July 2019, 6 participants had led this kind of CPD for their colleagues.

The following conclusions were therefore drawn:

- Most participants had an understanding of a range of different forms of teacher education they could undertake with their colleagues and the majority had some experience of leading the education of their peers. (Hammersley-Fletcher, 2002)
- The teacher education strategy with which participants had least prior experience was leading formal INSET or CPD sessions.
- There is no evidence to state how often teachers enacted each of the behaviours they described: it is not possible to tell whether an activity took place once, as a one-off event, or whether it was an embedded element of their practice, occurring on a regular basis.
- From the data collected, it was also not possible to ascertain whether participants were describing ways in which they had received support themselves or ways they had developed the practice of others: the two NQTs described working with their NQT mentor or maths lead on shared planning.

A key element of this research project was to design and implement a bespoke intervention, matched to the needs of participants. (Higgins et al., 2015) (Cordingley et al., 2020) This reconnaissance phase was therefore important to inform decisions about the content and structure of the intervention.

4.2 What elements of the programmes do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?

As most of the planned intervention was not able to take place due to the COVID-19 lockdown, as stated in the methodology, a proxy approach was taken. Much of the intervention that actually took place was on-line and was situated within a programme with a much broader remit than developing the participants' practice as teacher educators of their peers.

Data relating to this question was gathered through 1:1 Zoom interviews carried out with six participants at the end of the academic year. They were asked: *What aspects of the Mastery Readiness programme have been most useful in developing your skills, ability or confidence to work with your peers to develop their practice?*

This question was deliberately designed to be open ended in order to encourage participants to think widely about their experiences over the year of the programme and from this distil out any issues that could give me insights and evidence about their parallel development as teacher educators. (Cohen et al., 2018) The remote nature of the interview meant it was not possible to remind participants of the full breadth of activities which had taken place, many of which were before the nationwide lockdown and school closures took prominence in the minds and thinking of respondents. However, this means that their responses can be held to accurately represent those elements of the programme which made the greatest impact on participants as they stood out in their minds. No limit was put on the length of responses or number of activities which each participant could suggest, which led to some respondents giving far more detail in their answers than others.

Section 3.4 of my methodology outlines the way in which schools were grouped according to the attendance of their staff at on-line CPD sessions held in May. Group 1 schools had no

additional teachers attending the sessions beyond those involved in the work group, so those participants were considered to have had little or no influence as teacher educators. Group 2 schools had attendance of 17-26% (so some peers being influenced) and Group 3 schools had 52-71% attendance (so a significant number of peers being influenced).

Participant responses were analysed and categorised first to identify activities suggested most frequently as having had the greatest impact on teacher educator development. They were then analysed more closely in order to identify whether the group to which a participant had been allocated was significant. Could any patterns in responses be detected? Could a difference be discerned between the responses of teachers in group 2 and group 3? Were the participants assigned to group 3 more likely to show evidence of having behaved or thought as teacher educators?

Responses to this question were initially categorised as follows:

	Total frequency	Group 2 (some colleague participation)	Group 3 (greater colleague participation)
General (not relating to specific activities)	6	4	2
Specific activities carried out as a group	13	7	6
Specific activities carried out individually	3	2	1

Table 4: responses in each category by group

However, each person interviewed gave different examples of the parts of the programme which had been most useful in developing their skills, ability or confidence to work with their peers to develop their practice: rarely was an activity or element of the programme mentioned more than once. This is consistent with an understanding that learners respond in different ways depending on their level of prior learning and experience. (Berliner, 2004) It is also consistent with the literature which identifies the importance of context in teacher learning and development. (Scribner, 1999) (Clarke & Hollingsworth, 2002)

4.2.1 Responses categorised as general (not relating to specific activities)

Within the general category the activity which was mentioned most as being perceived by respondents as having had the greatest impact on equipping them to develop as teacher educators of their peers was sharing feedback on gap tasks. (Hamilton et al., 2016)

Completion of gap tasks formed an important part of participant learning during the initial preparatory phase of work with the two groups before the start of the work on which this research project was based. A cycle of learning was embedded, as outlined in section 3.4 of the methodology, adapted from the interconnected model of teacher development. (Clarke & Hollingsworth, 2002) New teaching ideas were introduced to the groups in a work group meeting and a gap task – something to be implemented in school – was set. Participants were able to carry out professional experimentation in their classrooms and reflect on the outcomes. (Leikin & Zazkis, 2007) (Schon, 1983) The next time they met together, participants fed back to the other group members about the results of their classroom experimentation and reflections.

Had the intervention proceeded as planned, this cycle would have continued to be used to develop the participants as teacher educators of their peers. However, lockdown prevented this from taking place. It is therefore interesting that the cycle of implementing learning through professional experimentation and feedback was credited by more than one respondent as having made a significant impact on their development as teacher educators of their peers.

(Loughran, 2007a) exhorts teacher educators to 'teach as you preach'. He stresses the importance of teacher educators modelling the practice they wish their learners to adopt. It is concluded that the practice modelled through the implementation of a cycle of learning, experimentation and feedback was significant in the development of participants as teacher educators of their peers. Because they knew how much they had themselves learnt by taking

part in this cycle, they could see the importance of adopting it in their own teacher education practice. (Lunenberg et al., 2007)

Exploring the reasons why participants choose to talk about particular activities was beyond the scope of this research project. However, it is hypothesised that there are several reasons why sharing the outcome of classroom experimentation on gap tasks made such an impact. It may be because of the contribution the sharing of experiences made to the creation of a shared learning community (Jaworski, 2005): participants were able to share success stories and challenges, providing mutual encouragement. It may also be because it provided an opportunity to revisit learning from a previous session, enabling participants to deepen the connection between their learning and practical experience. (Leikin & Zazkis, 2007), (McIntyre, 1995). It may also be because it provided the opportunity to reflect on practice. (Schon, 1983), (Clarke & Hollingsworth, 2002) These suggestions are consistent with the conclusion that my modelling of good teacher education practice facilitated participants' growth as teacher educators.

4.2.2 Responses categorised as relating to specific activities carried out as a group

Responses included in this category referred to specific episodes during work group meetings: participants named or described activities they had participated in which they felt had had the greatest impact on their development as teacher educators.

The activity mentioned most often was a session in the initial preparatory phase of the programme, in which beliefs about what it means to be a mathematician (Thompson, 1984) and how this informs the vision for mathematics at a school were explored. Four interviewees talked about how they had taken the activities from the group meeting and carried them out with their colleagues (or pupils) in school: one had taken it further and implemented it with all staff and Governors, using it to form 'a vision for maths at our school which is now at the top of the maths policy and runs through everything we do with maths as a school.'

One participant, in her interview, reflected the experience of others when she explained that leading her peers to consider their beliefs about what makes good maths education (Korthagen, 2004) had provided the opportunity for a wide-ranging discussion about the conflicts that arise between beliefs and practice when faced with the pressures of "getting through the curriculum," enabling her to support her colleagues to understand the reasons why she was advocating a connectionist approach to teaching and how this would benefit their pupils.

Another participant gave all teachers and pupils a questionnaire about mindsets and attitudes to what makes good maths learning. He then compared the results of individual teachers and their pupils and identified that although some teachers' responses stated they promoted a growth mindset approach to maths, this was not reflected in the responses of the children they taught. This then provided him with an opening to address the teachers' beliefs which were informing their classroom practice.

However, from knowledge of the participants gained through working with them over the academic year, I know that the other two respondents carried out similar activities with their pupils and staff, but those teachers did not mention this during the interview. This is a disadvantage of such an open interview format: had respondents been presented with prompts about the full range of activities carried out, it is likely that they too would have included activities relating to beliefs and vision in their responses. (Cohen et al., 2018) If this study were to be repeated in the future, there would be benefit in adapting the methodology to enable an amalgamated list of responses to be presented to participants so they could select those which had the greatest impact or to rank ideas to show which had made the greatest difference to them on an individual basis. However, the remote data collection necessitated by lockdown meant this methodological choice was not available on this occasion.

As all interviewees enacted this activity with their peers, it is concluded that spending time at the start of the programme to establish beliefs about and vision for teaching mathematics is extremely valuable. A shared understanding of the importance of having a clear vision for mathematics teaching within their schools ensured participants knew the purpose of the work they were undertaking. (Cordingley et al., 2020) It also enabled them to present their colleagues with a clear reason to engage with development designed to improve their professional practice, thus supporting the participants to act as teacher educators of their peers from the outset of the Mastery Readiness programme. (Korthagen, 2004)

The remaining responses in this category can be categorised either as ways of working or specific activities. These responses and their implications will now be considered, to explore the ways and extent to which the participants' development as teacher educators is exposed.

Comments categorised as ways of working include: "actually playing the games myself and experiencing for myself what the children might experience," or "using concrete resources – sharing the "secret" of maths with the children and helping them all to see that they are mathematicians." Throughout the Mastery Readiness sessions, the principle of "teach as you preach" (Loughran, 2007a) was adopted. The teachers recognised that participating in activities in the way that children would, helped them to appreciate the value of the pedagogical approaches being recommended to them. (Leikin & Zazkis, 2007) However, as lockdown severely constrained their opportunities to work with their peers, at this stage there is no evidence that they have then taken this experience into their own teacher education work. It is hypothesised that when teachers speak enthusiastically about the impact of an activity on their own practice, it would be reasonable to conclude that they would then conduct that activity with their peers. It would be interesting to explore these responses further, once teachers have the opportunity to work with their peers in school again. Have

they adopted this pedagogical stance with their peers? Has a conscious choice been made to do this, which they can articulate, along with the motivation for so doing?

Responses categorised as relating to specific activities included both those which could be carried out with pupils in the classroom and those which related to subject leadership. Initially, the description of classroom activities does not appear to provide evidence for the respondents' development as teacher educators. However, when talking about these specific activities, they often described the impact that participating in the activity had had on them as a learner: they spoke about the importance of taking part in activities as part of their learning process, which shows the development in their thinking as teacher educators: they were aware of the impact of practical engagement in teacher learning. Comments relating to subject leadership activities followed a similar pattern. Participants spoke first about the activity and how it had influenced them, and sometimes went on to speak about how it had influenced their work with their peers. For example, one described a post-it note activity which he subsequently used with his peers to support them to identify the priorities for the development of the subjects they led, in the way we had worked together to do this for maths. Another spoke about the value of sessions on implementing change as understanding the process helped prevent her from becoming frustrated when change hadn't happened as quickly as she wanted it to.

Appendix 5 shows the full range of answers provided by participants to this question. The diversity in responses is consistent with an understanding that teachers learn differently depending on their level of prior experience (Berliner, 2004) and the context in which they work. (Scribner, 1999) (Ernest, 1989)

In a work group made up of participants with a wide range of prior experience and from diverse contexts, it is concluded that it is important to offer a wide range of activities to

participants. They can then select those they feel are most relevant to their working context to enact.

However, merely presenting participants with a variety of approaches is not sufficient: consideration has also to be given to the ways in which participants will be encouraged to put their learning into practice. (Leikin & Zazkis, 2007) The Clarke & Hollingsworth (2002) interconnected model of teacher growth, adapted for use in this teacher education programme, stresses the importance of enactment and reflection at all stages of the learning process. The provision of gap tasks, along with the expectation that participants would share with others their implementation experiences, enabled both the enactment of and reflection upon learning at work group meetings.

4.2.3 Responses categorised has having been carried out individually

The responses grouped into this category referred to discussions and activities generated as part of bespoke visits to schools. They were by their very nature individual and related very specifically to the individual respondents and the situations in which they work. Although only three of the 22 activities mentioned were categorised in this way, for those participants who did mention them, they were significant in their development as teacher educators of their peers. In one case, the maths lead was supported to carry out a learning walk, agree teaching development priorities for the school and then plan ways for him to support his colleagues to work towards achieving these priorities as this was an important element of subject leadership of which he had no prior experience. In another school, the maths lead was also oracy lead for the school, so we agreed that she would model leading a maths activity in which pupils were encouraged to develop and share their mathematical reasoning orally, thus enabling her to achieve two objectives at once. We also discussed how she would follow up on the model lesson with her peers to maximise their learning from the activity. The same respondent spoke about the one to one conversations we had, and how they had helped her clarify her thoughts.

These two participants had a very different level of prior experience and worked in very difference contexts, so the support required to facilitate their development as teacher educators of their peers was also very different.

Bespoke school visits were another area of the planned intervention which was curtailed by lockdown. Each participant would have received three more bespoke support visits, had COVID-19 not intervened. As the relative importance of peer education within the Mastery Readiness programme would have increased throughout the year, it is considered fair to assume that the content of bespoke visits would also have placed an increasing emphasis on peer education.

22 different responses were given by six interviewees to the research question 'What elements of the programme do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?' This supports the claim that the bespoke nature of the intervention was key: it enabled the support provided to be tailored to meet the needs of a group with many different starting points and working in differing contexts. It also enabled participants to develop as peer teacher educators at their own speed, taking account of the differing opportunities to support colleagues available at each of their schools.

4.3 In what ways and to what extent do the participants now view themselves as teacher educators of their peers, as evidenced by behaviours and confidence to act?

I will address each part of this question in turn, first considering participants' *confidence* to act as teacher educators of their peers, then their *behaviour* as teacher educators. I will then consider the issue of identity: their view of themselves as teacher educators of their peers.

4.3.1 Confidence to act as peer teacher educators

The intervention started by considering strategies which can be used to lead effective CPD. Participants worked together to compare their experience as a participant in CPD with the published research on the subject. (Higgins et al., 2015), (Ofsted, 2019b) Time was then spent developing a CPD session to be delivered back in school with their peers and a gap task was set to lead this CPD session, with the experiences of doing this to be discussed at the next joint meeting.

Unfortunately, the COVID-19 lockdown meant that many participants were unable to implement their planned session. It was also not possible to meet together again in person to work as a shared learning community, exploring each other's experiences and learning together (Jaworski 2005). Lockdown also prevented the exploration and enactment of further teacher education strategies at future group meetings, although one final on-line meeting was held, in which different models of teacher learning were shared.

It was therefore decided it would not be meaningful to seek data relating to teacher education led by participants: participants were instead asked to state their *confidence* in enacting a range of teacher education strategies. All participants were sent a questionnaire by email. Due to the lockdown related pressures on school staff at the time, only 15 out of 24 were returned and a deliberate choice was made to not chase other responses.

(i) Leading CPD

The questionnaire (N= 15) first asked about confidence in leading CPD, both where resources are supplied and where the participant is required to produce their own resources. This distinction was introduced as the baseline questionnaire revealed that following the autumn term work group meetings (after which CPD resources were shared with group members), 63% of participants had led staff meetings for their colleagues in which they shared resources

and ideas from the meetings. Respondents were asked to answer yes, maybe or no to the two questions probing their confidence to lead CPD in the two different situations.

	Yes	Maybe	No
Do you feel confident to lead CPD when resources are supplied for you to use	12	3	
Do you feel confident to lead CPD when you need to write your own resources	7	7	1*

Table 5 – responses to closing questionnaire question 1

*Response from NQT

The change in participant behaviour or confidence to act as teacher educators of their peers can therefore be summarised as follows:

Percentage of participants who led CPD for colleagues in the two terms before the start of the programme	33% (8 out of 24)
Percentage of participants who led CPD for colleagues following the autumn term work group meetings (using resources supplied)	63% (15 out of 24)
Percentage of participants confident to deliver CPD with resources supplied	80% (12 out of 15)

Table 6 – change in number of participants who have led or are confident to lead CPD

It is therefore argued that even though the topic of teacher education was only partially addressed due to COVID-19, participation in this intervention led to a significant increase in both those who had led CPD and who perceived that they were confident to lead CPD when they have the opportunity.

(ii) Other teacher education strategies

Participants were then questioned further about their confidence to enact a wider range of teacher education strategies, including some covered during the part of the intervention that actually took place and some which had not been addressed and with which participants would be unlikely to be familiar. Responses indicated a high level of confidence to enact all

strategies listed, regardless of the level of prior experience of the respondent or whether the strategy had been considered as part of the intervention. Although this finding may appear positive of the role of the intervention there may be some bias in that I know the participants well and had established a close relationship with them throughout the time of working together. Therefore, I am concerned that the participants, in answering so positively, may be trying to please the researcher and so the claims made here must be treated with some caution.

4.3.2 Behaviour as Teacher Educators

As said in the methodology six participants were interviewed, with the focus for questions being a short series of on-line CPD sessions I offered in May when Covid-19 prevented the main intervention from going ahead. The intention was to probe the extent to which participants were thinking and acting as teacher educators of their peers by exploring their response to the on-line sessions. Care was taken to ensure interviewees included both those who had encouraged the majority of their colleagues to attend, often more than once, and those who had had fewer colleagues attend.

Participants' responses were wide ranging and illuminated the diverse ways in which they had thought and acted. Analysis and categorisation of statements made in interviews exposed the breadth and frequency of responses, enabling conclusions to be drawn about the ways and extent to which participants were behaving as teacher educators of their peers.

I will consider the responses to each of the questions posed in turn.

(i) Question 1: Why did you decide to invite your colleagues to the online sessions in May?

Reason	Total Frequency	Group 2 (some colleague participation)	Group 3 (greater colleague participation)
Exposure to new/different ideas	4	2	2

To encourage/support colleagues	4	3	1
Support plans for subject development	3		3
Good opportunity/lack of CPD in past	3	3	
Exposure to a different voice/someone else delivering the message	2	2	
No plan/hadn't really thought about it	2		2
Networking opportunities & idea sharing	1		1
Provide starting point for discussion in school	1		1
Timing	1	1	

Table 7: Participants' motivation for inviting colleagues to attend on-line CPD

From this it can be seen that participants showed a wide range of motivations for encouraging their colleagues to attend, almost all of which, arguably, seem to show their concern for the education of their peers.

Responses in each category were then viewed in relation to the group to which the participant was allocated as it was hoped this would provide additional illumination for the emerging picture of the work group members as developing teacher educators of their peers. However, responses were evenly split between the two groups and it was not possible to discern a difference in motivation on this basis. It is proposed that this is because of the external factors influencing the number of colleagues who participated in the on-line sessions, as outlined in section 3.4: interviewee selection. Factors beyond the control of the participants determined the percentage of teachers who attended from each school.

(ii) Question 2: How have you subsequently used the on-line sessions with colleagues?

Reason	Total Frequency	Group 2 (less colleague participation)	Group 3 (greater colleague participation)
Examples of influence on individual colleagues or teams, particularly following discussion with other schools	18	8	10
No formal follow up	6	3	3
Structured, planned follow up	5	0	5
Other positive outcomes (examples below)	4	1	3
Misc (examples below)	2	1	1
Examples of how colleagues have not been influenced	1	1	

Table 8: Participant follow up to on-line sessions

Other positive outcomes – examples

- Maths Lead has tried to collect in the concrete resources for the end of the year as she always does, so they can be redistributed in September. Her colleagues won't let her have them as they are all still using them!
- It also gave the maths leads credibility with their Head as it showed how much they know and will be good for their performance management!
- (They were ace!). It was far more effective than a staff meeting because people could choose a time slot that worked for them rather than sitting in the staffroom after school tired and distracted after a day of teaching.
- The sessions very much achieved his aim of enabling the school to come up with a shared plan of where to go next, based on the shared experiences of online sessions.

Misc- examples

- Staffing is quite consistent for next year (least change Maths Lead has ever known) so they have a good basis to build on.

- The online sessions very much achieved his objectives

This question was asked to probe the ways and extent to which participants were acting as teacher educators of their peers.

The pattern here is a slightly different: teachers in group 3 seemed a little more likely to talk about ways they had followed up on the sessions with their colleagues. There are a several possible reasons for this (although it is also important to recognise the numbers of responses are small and so not necessarily statistically significant).

Firstly, this may be because a greater proportion of their staff had attended the online sessions, there were greater opportunities for shared conversation and follow up as a whole staff. The on-line sessions acted as a representation of practice (Buchbinder & Kuntze, 2018), enabling colleagues to discuss their experiences and develop together a shared learning community (Jaworski, 2005) within the staff team.

Secondly, it may also be because all of the schools allocated to group 3 had already committed to large scale change in approaches to maths teaching in the coming academic year. Work within the Mastery Readiness group included strategies for the management of change (Kotter, 2007), (Education Endowment Fund, 2019) so the group 3 maths leads were all implementing action plans they had written which placed a clear emphasis on the importance of providing support for their colleagues. The education of their peers was an important part of their preparation work.

Thirdly, it may also indicate that the teachers in group 3 were more likely than those in group 2 to be thinking as peer teacher educators. They both recognised the value of the opportunity provided by the on-line sessions and then made greater use of chances to engage with their peers, using the shared experience of on-line learning to initiate discussion.

However, other factors influencing the number of colleagues who attended the on-line sessions, thus determining the group to which participants were allocated, must also be considered here. One of the group 2 schools had a very high level of attendance in the first week of sessions but, due to other pressures on staff, the Head instructed the maths lead to not invite colleagues to the second week of sessions. Another of the group 2 schools was an infant school, thus the Key Stage 2 sessions were not relevant to them: their attendance at EYFS and Key Stage 1 sessions was in line with schools allocated to group 3.

Conversely, one of the participants in group 3 was somewhat surprised by how many of his colleagues attended the on-line sessions. He explained he had simply forwarded the email giving details and saw it as both a credit to his colleagues that so many of them attended, and a reflection of the lack of learning opportunities available to them in the past. The knowledge of him gained from working with him 1:1 over a longer period provides additional evidence to support my conclusion that this participant is not yet thinking as a teacher educator of his peers despite having had a high percentage of his colleagues participate in the on-line sessions.

Behaviour as a teacher educator - summary

This section has presented the data about the respondents' behaviour as teacher educators.

A wide range of responses to the opportunity to act as a teacher educator of peers has been revealed. Given the wide range of contexts from which participants come (Scribner, 1999) (Clarke & Hollingsworth, 2002) and the variety of prior experience with which they commenced this intervention (Stanovich 1986) (Wiliam, 2016), it is to be expected that they would respond to the stimuli with which they were presented in different ways. This is consistent with stage theory (Berliner, 2004) which explains how teachers at different stages of their careers learn differently. It is therefore concluded that when supporting teachers to develop as teacher educators of their peers, it is important to provide participants with a wide

range of strategies upon which to draw. Opportunities for participants to connect their new learning with prior knowledge are thereby increased, as is the likelihood of them encountering strategies which are relevant and practicable to implement in their place of work. Although lockdown prevented it from being fully implemented, the bespoke element of the support provided was mentioned as being key for several participants, as this enabled learning opportunities to be tailored to meet their individual needs. Providing opportunities for teachers to put their learning into practice (Clarke & Hollingsworth, 2002) and to discuss their learning with each other, thus providing mutual support and encouragement, (Jaworski 2005) was also found to be important in influencing teacher development as teacher educators of their peers.

4.3.3 Identity

The discussion above relates to the ways and extent to which participants have either acted, or expressed their confidence to act, as teacher educators of their peers. Evidence relating to possible changes in participant identity will now be discussed: did the bespoke programme of support provided to participants prompt changes in their self-image? To what extent do they now see themselves as teacher educators of their peers, alongside their primary professional identity as primary school teachers?

This question was addressed by analysing the responses of teachers during interviews. Two areas within the available data have been considered to provide evidence of any possible change: the participants' responses to the impact of the on-line sessions on their colleagues, and the way in which they described the elements of the programme which had the greatest impact on them. What do their responses reveal about the way they were thinking about themselves? I will consider each of these areas in turn.

(i) Participants' responses to the impact of on-line sessions on colleagues

When interviewed about the ways in which the on-line sessions had subsequently been used with colleagues, the response category which contained the greatest number of comments was the impact on their colleagues of attending the on-line sessions. Every interviewee spoke about this, with some describing the impact at length. It is therefore instructive to examine their responses in more detail to explore how they expose the development of the participants' identity as teacher educators.

Some responses were general in terms of the impact of these sessions on their colleagues, for example one teacher said:

> *Conversations with colleagues have shown that the sessions achieved the aim of boosting teacher confidence as although they can do the maths they are teaching themselves, they lack knowledge about how to teach it effectively. The conversations in break out rooms worked really well to boost subject knowledge and confidence"*

Other comments on impact were related to specific groups within the school, for example:

> *The feedback from the LKS2 staff who attended was very positive as they came away excited to try out ideas they had heard – they could see the value using White Rose can bring. They really valued the discussions and found them very useful and after the sessions they were very keen and buzzing."*

Finally, some referred to the impact on specific individuals

> *XX (y5) has used the I See Maths lesson videos in every lesson since he attended the online session where we unpicked one so he's using the ideas from that session every day. He has been amazed by the way children with a wide range of abilities are all engaging with and enjoying the video lessons."*

The common thread through the responses was that each interviewee was thinking about the impact of the teacher education experience on the classroom behaviour of their colleagues. They might not have had the chance to provide the learning themselves, but they were aware of the learning that had taken place and the opportunities to subsequently build on it in school. It is therefore concluded that this provides evidence that they were thinking in ways that were beginning to position themselves as teacher educators of their peers.

(ii) Description of programme elements which had the greatest impact on development of participants

As described in section 4.2.2 above, respondents' descriptions of programme elements which had an impact on their development also reveal the ways in which their thinking as teacher educators of their peers was developing. When describing specific activities or ways of working, some respondents talked about the impact of participation on their learning process, (Leikin & Zazkis, 2007) for example the benefit for teachers in participating in activities which could then be implemented with pupils. They were aware of strategies for improving teacher learning and are now able to apply this knowledge when leading the education of their peers.

However, their developing thinking as teacher educators of their peers is less clearly evidenced than in comments relating to the impact of the on-line sessions. It is hypothesised that this is due to lockdown preventing participants from leading teacher learning opportunities themselves. Had they been able to lead CPD sessions in the way which was planned, they would have had the opportunity to reflect on the experience (Tzur, 2001) (Loughran, 2011), which could then have had an impact on the development of their identity as teacher educators.

It is therefore concluded that the interview evidence reveals participants' beginning to develop an identity as teacher educators of their peers. Both their actions, and their confidence to act, showed that despite the intervention being curtailed, they were developing

as teacher educators of their peers. It is likely that for many participants, this intervention was the first time that they had been exposed to the concept of their role as maths lead including responsibility for leading the education of their peers. (Lunn & Bishop, 2002) Providing space in work group meetings and 1:1 school visits to introduce the idea of being a peer teacher educator and the ways in which the participants could develop this part of their role opened up the possibility for them to adopt this identity. Taking part in the work group also opened up opportunities for participants to act as peer teacher educators: their learning from the group meetings was something they wanted to share with their peers; they had learning to pass on. Providing resources and modelling good practice in teacher education (Loughran, 2007a) (Lunenberg et al, 2007) removed the potential barriers of not knowing what to include, how to sequence content effectively (Higgins et al, 2015) and how to engage teachers as learners (Leikin & Zazkis, 2007).

The provision of time and space for reflection seemed also to be an important part of the process of developing the participants' identities. Tzur (2001), McIntyre (1995) and Loughran (2011) all discuss the importance of reflection in the development of new identities. Reflection time was available both during work group meetings and also between meetings, whilst reflecting individually on practice. (Schon, 1983) Questioning and discussion during 1:1 bespoke school visits also prompted reflection. Providing reflection opportunities for participants enabled them to start to develop a new professional sub-identity.

However, throughout the interviews, none of the participants used language or spoke in ways which suggested they directly viewed themselves as teacher educators of their peers. The range of activities suggested as having had the greatest impact on the participants does not, at first sight, suggest that they are thinking as teacher educators. Of the 22 separate comments made during interviews, only one referred to the explicit teacher education element of the programme ("*the last virtual session on teacher learning made a lot of sense but I hadn't*

thought about it before."). The sessions spent looking specifically at teacher education, for example the evidence about what makes effective CPD, clearly had not made as much of an impression on participants as other activities, yet their behaviour and thinking changed.

This may be because of the curtailment of the programme due to lockdown: the sessions delivered relating to teacher education, and opportunities to enact that learning, comprised a comparatively small part of the sessions delivered overall. It may also be because interviews were carried out remotely, some months after the majority of work together had taken place. However, it is considered more likely that this apparent lack of identity change was because of the duration of the intervention.

Literature is clear that the adoption of a new teacher educator identity takes place over time. It is a gradual process (Goodwin & Kosnik, 2013), often taking two to three years (Murray & Male, 2005). Given that Hamilton et al. (2016) conclude that viewing oneself as a teacher educator is an on-going process with no defined point at which the identity solidifies, it is reasonable to view the development of identity as teacher educator as being on a continuum, just like stage theories of teacher development (Berliner, 2004). As said, participant responses suggest they were acting as teacher educators but don't see themselves as such. Their identity as teacher educator is still in formation. Over time, as they are presented with opportunities to act as teacher educators, it is suggested that their professional confidence will grow (Murray & Male, 2005), allowing this new sub-identity to be more fully formed alongside their existing professional identity of primary school teacher. The challenges of adopting a new sub-identity identified by Beijaard et al (2004), along with the internal conflict caused by moving from expert teacher to novice teacher educator (Murray & Male, 2005), will subside over time as their experience and expertise as a teacher educator grows.

In summary, the participants in this intervention had developed as teacher educators of their peers, as evidenced by both their behaviours and confidence to act, however their identity as

a peer teacher educator was not yet sufficiently formed for them to articulate it or to describe themselves as such.

5. Conclusions

This research project was carried out to investigate the ways and extent to which two groups of teachers could be supported to develop as teacher educators of their peers so that they could share their learning from an NCETM work group with their colleagues. I will first return to each subsidiary research question, summarising the findings relating to that question. I will then discuss the limitations faced in the implementation of my research and finish by outlining implications for future research, for my personal practice and more widely in the running of similar NCETM work groups.

5.1 What understanding of teacher education do participants hold at the start of the programme?

Data gathered the start of this project showed that participants had a broad understanding of teacher education, with the majority describing activities such as shared planning, lesson observations or learning walks in which they had participated in the year before the start of the project. However, from the data gathered it was not clear whether this experience was as a learner or a teacher educator, nor the ways and extent to which they had led these forms of teacher education for their peers. A smaller number of participants had led formal CPD sessions for their colleagues. This information was used to inform the first steps of the intervention, namely starting by exploring strategies for leading effective CPD sessions and then preparing CPD sessions to lead for colleagues. Unfortunately, lockdown prevented the majority of participants from leading these sessions, and it was also not possible for the intervention to develop in response to participants' experiences of leading teacher education. Had lockdown not intervened, the intervention would have continued to develop in collaboration with the participants, responding to their changing needs as they enacted and then reflected upon their learning.

5.2 What elements of the programme do participants perceive to have had the greatest impact on equipping them to develop as teacher educators of their peers?

Teachers came to the programme from a wide range of backgrounds and contexts (Scribner, 1999), thus they all had different professional development needs and different opportunities to lead the education of their peers. Therefore, provision of a wide range of strategies to influence the behaviour of peers was found to be important as it increased the likelihood of learning opportunities being relevant to the contexts and prior experience of individual participants. It also increased the chances of them being able to draw on strategies relevant for their context and stage of professional development (Berliner, 2004).

The diversity of responses by participants to the intervention led to the conclusion that the bespoke nature of the intervention was key – one size does not fit all. This enabled the support provided to be tailored to meet the needs of a group with many different starting points and working in differing contexts. The more closely the programme seems to be tailored to meet individual needs, the greater the impact will be.

Time spent at the start of the work group, agreeing a shared vision on which all other work was built, enabled participants to keep their focus on the reason why they were participating in the programme (Kotter, 2007). The evidence suggested that they were able to communicate the clear vision to their colleagues, thus potentially increasing the impact of their teacher education work as their learners understood the purpose of the sessions they led or facilitated.

To maximise the likelihood of participants enacting their learning about teacher education, this research seems to indicate that they should be supported and encouraged to put their learning into practice through a cycle of professional experimentation and feedback (Clarke & Hollingsworth 2002). It was found that the gap tasks included in the cycle of learning developed with these participants were important for two reasons. Firstly, they increased the

likelihood of new learning being enacted: knowing they would be expected to share their experiences with other group members encouraged all to develop their practice. Secondly, it supported the creation of an ethos of a shared learning community (Jaworski, 2005), with all members sharing their experiences and reflecting on learning. It provided an opportunity to revisit prior learning and think about it differently. My modelling (Loughran, 2007) of this approach to teacher learning was described by participants as particularly influential in their development as peer teacher educators because it enabled them to experience first-hand the impact of this approach to teacher learning.

5.3 In what ways and to what extent do the participants now view themselves as teacher educators of their peers, as evidenced by behaviours and confidence to act?

The evidence suggests that with the provision of a bespoke programme of support, primary school teachers and maths leads can be empowered to act as teacher educators of their peers (even if they do not yet identify as such). However, it has been argued that identity change follows behavioural change: changes in behaviour need to become embedded over time before teachers become sufficiently comfortable with the identity of teacher educator to refer to themselves as such (Goodwin & Kosnik, 2013), (Murray & Male, 2005).

Evidence also suggested that contextual factors were significant in teacher educator development: however much a teacher might want to act as a teacher educator of their peers, if their setting does not give them the opportunity to do so, their development as a teacher educator will be severely limited (Clarke & Hollingsworth, 2002).

5.4 Limitations

The COVID-19 lockdown presented significant limitations for the implementation of this research project as much of the planned intervention could not be carried out due to school closures and social distancing requirements. This made it almost impossible for the

participants to enact much of their learning about teacher education, which restricted their development as peer teacher educators. It was also not possible for the content of the intervention to evolve in response to the experiences and needs of the participants as planned. However, the data gathered at the end of the research project showed that despite these limitations, the participants who were interviewed showed evidence of developing as teacher educators of their peers.

The data collection methods available during lockdown also limited the quantity and quality of data which could be gathered. It was originally planned to gather closing data face to face, with participants being asked to talk about their experiences together in a semi-structured discussion which I would have recorded for analysis. This would have enabled me to stimulate discussions by providing prompts to participants to help them remember the full range of activities carried out. It would also have enabled participants to respond to each other's comments, thus making it possible to identify responses which resonated with the greatest number of participants, leading to more solid conclusions about the elements of the intervention which had the greatest impact on their development as peer teacher educators. A face to face discussion would also have made it possible to probe responses more deeply: the email questionnaire and Zoom interviews did not allow this. Finally, only 15 of the 24 participants completed the closing questionnaire as it was administered by email: had it been distributed in a face to face session, as was the opening questionnaire, a far higher number of participants would have responded, thus eliminating possible biases in the data caused by respondents selecting whether to reply or not.

5.5. Implications for the future

The findings from this research project provide a strong basis for me to develop the way I support participants to share their learning with their colleagues in school and thus act as teacher educators of their peers. I will be leading a further two cohorts of this programme for

NCETM this year and so will put into practice the findings outlined above and am looking forward to developing this intervention further, in collaboration with this year's participants.

As I discovered that it takes time for teachers to adopt the identity of teacher educator, I will deliberately talk about the teacher educator role from the start of the Mastery Readiness programme as it will enable the process of identity development to start straight away: participants will be exposed to the concept of being a peer teacher educator as being part of subject leader role earlier. I will explore whether this makes them more able to adopt this new sub-identity and consciously articulate the ways in which they are developing the education of their peers.

The unprecedented situation faced in 2020 prevented this research project from being fully implemented. One element of the programme I was unable to develop as I wished to was the use of lesson observations, supporting participants to model for their colleagues. In February and March, during bespoke school visits, I started to work with three participants to explore ways of maximising learning amongst those observing a demonstration lesson: this is something I will develop further as it was showing great promise as a teacher education tool.

In order to work with participants to develop their skills as teacher educators, I needed to be able to communicate the key elements of the teacher educator knowledge base, using the way I implement these as a teacher educator educator to model and illustrate good practice. However, the area of my knowledge base I developed the most during this research project was the ability to act contingently. Lockdown necessitated quickly finding new ways of working, responding in the moment to rapidly changing circumstances. My findings show that the bespoke element of support on offer to participants was found to be key in their development as teacher educators of their peers: responding to individual contexts and needs will always require the ability to act contingently. The ability to make decisions in the moment, informed by experience and a secure understanding of relevant literature, will

therefore be an important element of my teacher education work which I will continue to develop.

Supporting work group members to share their learning with colleagues has been recognised by NCETM as a priority at national level: one of the Assistant Directors who leads the Mastery Readiness programme has asked for a copy of this dissertation and other Directors have also expressed their interest in the findings. Local colleagues have also expressed interest in implementing findings from this project in their own leadership of NCETM work groups: I will be leading an on-line CPD meeting next spring to share my findings with them and discuss how others can put them into practice.

Despite the limitations identified above, I believe this research project has made a useful contribution to understanding ways in which primary teachers can be supported to become teacher educators of the colleagues with whom they work, sharing their own learning in order to develop teaching across the school for the benefit of the most important members of the school community: the pupils. The findings will influence both my own future work and be shared more widely to influence the work of other teacher educators, to achieve the aim of ensuring “professional development practices are in place so that the cycle of change can be implemented.” (Appendix 1 – NCETM Work Group Plan)

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Appendix 1: Work Group Plan

Work Group Plan (2019/20)

Project Title	**Mastery Readiness**		**Project number:**	
Maths Hub			**Maths Hub Code**	
Work Group Lead/s				
Evaluation report author		**Partnership agreements in place for all Work Group Leads?**		Yes/No?
MHLM team link				

Intended outcomes

What are the specific intended outcomes of this Work Group?	
Professional learning	**Professional learning** Head teachers and participant teachers (including the maths subject leader) will receive bespoke support from the Mastery Readiness Leads and the NCETM to develop understanding and implementation of the big ideas of Mastery Readiness.
Teaching and/or leadership practice	**Practice development** • Leaders in the participant schools will be develop a vision for what mastery will look like in their school and will be actively working towards implementing changes in their school. • Leaders will ensure professional development practices are in place so that the cycle of change can be implemented In line with their bespoke action plan, teachers will implement changes to practice in their classroom and will be able to identify the impact of these changes on pupils.

Whole school/ departmental policies and approaches	**Whole school/departmental policies and approaches** • Leaders will reflect upon current practice and prioritise actions, with support from the MR Leads. They will identify areas for development and will develop an action plan which will be worked upon and the impact of which evaluated. School systems and mindsets are conducive to beginning and fully participating in the Teaching for Mastery Development Work Group in Autumn 2020
Pupil achievement, attitudes, participation or experience	**Pupil outcomes** • All pupils will demonstrate an improved mathematical mindset leading to an improvement in pupil progress because the school has a clear vision for mathematics which is shared with all stakeholders • Implementing the bespoke school action plan will have a positive impact on identified groups of pupils and the staff are able to articulate the extent of the impact

Appendix 2: Details of Participants

Position in school	Description of school
Maths Lead & Year 6 teacher	Single form entry primary school with high level of pupil and staff mobility due to proximity to military base
Maths Lead & Year 2 teacher	Small rural primary school with mixed age classes
NQT & Year 4/5 teacher	Small rural primary school with mixed age classes
KS1 Phase Lead & Year 2 teacher	Single form entry inner city primary school serving area with high level of deprivation
NQT & Year 3 teacher	Single form entry inner city primary school serving area with high level of deprivation
Maths Lead & Year 4 teacher	Two form entry inner city primary school serving area with high level of deprivation
RQT & Year 6 teacher	Two form entry inner city primary school serving area with high level of deprivation
Maths Lead & Year 2 teacher	Recently founded inner city primary department of a secondary school. Varying numbers of pupils in each year group – many mixed age classes. Serves area with high level of deprivation
Deputy Head & Maths Lead	Single form entry inner city primary school serving area with high level of deprivation
Year 5 teacher	Single form entry inner city primary school serving area with high level of deprivation
Maths Lead & Year 5 teacher	Two form entry town centre academy serving area with high level of deprivation
Year 2 teacher	Two form entry town centre academy serving area with high level of deprivation
Maths Lead, Year 3 teacher & SENCO	Single form entry rural primary school
HLTA	Single form entry rural primary school
Maths Lead & Year 4 teacher	Single form entry rural first school (to year 4)
Deputy Head & Year 1 teacher	Single form entry rural first school (to year 4)
Maths Lead & Year 3 teacher	Three form entry urban junior school
RQT & Year 6 teacher	Three form entry urban junior school
Maths Lead, Year 1 team leader & Year 1 teacher	Three form entry urban infant school
Numbers Count maths intervention teacher	Three form entry urban infant school
Maths Lead & Year 6 teacher	Two form entry primary school
Maths Lead & Year 2 teacher	Two form entry primary school
Maths Lead, KS1 Lead, Year 2 teacher	Two form entry urban primary school
Year 5 teacher	Two form entry urban primary school

Appendix 3: Mastery Readiness Information for Applicants

Primary Mastery Readiness Work Groups

Information and Application (2019/20)

In 2019/20, all Maths Hubs will be running primary mathematics Mastery Readiness Work Groups led by Mastery Readiness Leads. This programme is for schools who have a commitment to developing a teaching for mastery approach long term, but who currently need additional support for improving mathematics teaching, learning and leadership. Although the participation involves two teachers attending events outside of the school, it is expected that these two teachers have the opportunity to lead development across the whole school. Each Maths Hub is now seeking to recruit schools for Work Groups, each involving up to eight schools. This document gives information about the Work Groups and how schools can apply to be involved. Your local Maths Hub will be given this information to make decisions about availability and your school's suitability for this programme and may be able to offer suitable alternatives, if necessary.

Background

Since 2014, the NCETM and Maths Hubs have been working together to develop approaches to teaching for mastery within primary mathematics. This has been partly informed by the teaching of mathematics in high performing South East Asian jurisdictions. Beginning last year, the NCETM and Maths Hubs have recruited schools to participate in a Mastery Readiness programme and these schools will continue to work in Teaching for Mastery Work Groups for two further years as they develop teaching for mastery in their schools.

The Mastery Readiness Work Groups

Each Work Group will be led by one of the Maths Hub's Mastery Readiness Leads and involve up to eight primary schools. During the year, they will work closely together to develop subject and pedagogical knowledge as well as supporting teaching, learning and leadership of mathematics across the school by looking at the Five Big Ideas of Mastery Readiness to lay the foundations to developing teaching for mastery in an effective and sustainable manner. The Work Group activity will include:

- Each school identifying two teachers to lead developments within their school, one of whom should be the maths lead
- The two teachers working together with the Mastery Readiness Lead and teachers from the other Work Group schools in half termly workshops. It is vital that the headteacher attends at least the first workshop with their staff
- Each school receiving half termly support visits from the Mastery Readiness Lead to support the participants and leaders to develop and work on an action plan for the school
- The headteacher working with the Mastery Readiness Lead and other members of the Maths Hub leadership to develop whole school policies and structures to support teaching for mastery

- The lead teachers, supported by the headteacher, working with colleagues to lay foundations for developing teaching for mastery approaches in the classroom, supported by collaborative professional development activity
- Following the first year the schools are expected to then continue being part of the Teaching for Mastery Work Group led by a Mastery Specialist. Beyond that year, there will be opportunities to continue embedding a teaching for mastery approach with the support of a specialist and other schools.

Benefits for participating schools

Participating in the Work Group will provide the following benefits to participant schools:

- High quality support the school including teacher professional development for the lead teachers, facilitated by the Mastery Readiness Lead
- Support for the headteacher in addressing leadership issues related to improving the teaching learning and leadership of Mathematics from the Mastery Readiness Lead and the Maths Hub's leadership team
- Opportunity to work closely with other schools also at a Mastery Readiness stage
- No charge for participation or for school improvement support and regular professional development (a grant of £1000 to help subsidise teacher release time in the Teaching for Mastery Development Work Group in 2020/21)
- In the second year, financial help, should the school make the decision to purchase textbooks (subject to DfE confirmation).

Who can apply

Mastery Readiness is designed for schools who are not yet in a position to develop teaching for mastery but want to in the future. The Work Groups are intended for schools in the following circumstances:

- Have not been part of a TfM Work Group previously (Essential)
  And at least one of the following:
- Has been judged at RI or Inadequate for at least their most recent Ofsted inspection
- Has low progress or attainment data for mathematics across the school
- Has been identified, by their Local Authority, as being suitable for the programme
- Is in an area of low social mobility such as Opportunity Areas, Category 5/6 areas
- Identifies as needing additional support for leadership of mathematics
- Has a high turnover of staff, meaning that the implementation of sustained change can be difficult
- Another identifiable reason for being unable to engage in developing Teaching for Mastery yet.

Expectations of participating schools

Schools chosen to participate in the Work Group commit to the following expectations:

- The lead teachers will participate in half termly workshops with the Mastery Readiness Lead and complete gap tasks

- The lead teachers will be released to work with Mastery Readiness Lead for half-day school visits each half term
- The headteacher will meet with the Mastery Readiness Lead regularly during the bespoke school visits
- The school will introduce a vision for implementing teaching for mastery approaches across the school, and will actively work on an action plan in order for the school to be Mastery Ready by the end of 2019/20. This could include introducing or developing collaborative, in-school professional development models to support all teachers and teaching assistants
- The school will provide any reports required by the Maths Hub and participate in any evaluation processes required
- The school will continue to work with other schools in the Teaching for Mastery Work Group for the year 2020/21 and beyond.

Funding

There is no charge to schools participating in the Mastery Readiness Work Group. There is no charge for the bespoke support of the Mastery Readiness Lead. Schools will be eligible for financial benefits in the following year.

How to apply

Schools interested in applying to be part of a Work Group in 2019/20 should complete the application form below and submit to their Maths Hub. Early applications are encouraged.

There is the opportunity to engage in the programme with other schools that you already work with, for example as part of an Academy Trust or local cluster of schools. Each school must still make an individual application, but you can indicate on the application form the schools you would like to be placed with.

Once the school has applied, the Maths Hub will then make contact with you to explain next steps.

Appendix 4: Baseline Questionnaire

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Director Professor Jo-Anne Baird

In what ways can a bespoke programme of support enable primary maths leaders to develop as peer teacher educators?

NAME: **ROLE IN SCHOOL:** **DATE:**

What forms of development have you experienced since January 2019 which were intended to improve your practice as a teacher? *(this could include attending external training courses, inset, internal staff meetings, observation of other teachers, shared planning, professional discussions with colleagues, lesson study, signposting to resources, mentoring, coaching, accessing resources on-line – this list is not exhaustive so please add others)*

Do you ever give maths support to other teachers in your school? YES/NO

If so, please tell me more about why, when and how this takes place.

Since January 2019, have you had any opportunities to run staff meetings/inset for colleagues: YES/NO

If so, please tell me when this was and what topics you covered.

What opportunities do you currently have to work with your peers (bearing in mind your teaching commitments and competing priorities within your school)?

Would you be prepared to discuss these answers in more detail with me in a virtual interview? YES/NO

Appendix 5: Coded and Categorised responses to interview question relating to activities which had the greatest impact on participants

Note: participants were coded using colours: these have been replaced with respondent numbers for reprographic purposes

Category: General (not relating to specific activities)

Respondent 1	The mix of pedagogical theory and practical examples which can be implemented in the classroom
Respondent 1	The strong research base in sessions gave the reasons why change in teaching strategies is important. It was really helpful to have the reasons why, not just being told what to do
Respondent 2	Initially the sense of enthusiasm and inspiration to try new things. The first session was really timely as staff at my school were all exhausted from initiative fatigue.
Respondent 3	Group discussions about gap tasks were useful, even if not everything being talked about was applicable, because it prompted thinking
Respondent 3	3 ways is a clever day – making maths accessible for all children
Respondent 4	Listening to the feedback on gap tasks at the second session where everyone talked about what they had put into practice in school. It really highlighted their achievements and what they had already done, which built confidence to continue.

Specific activities (as a group)

Respondent 2	Input about values and what makes a good mathematician was very useful to clarify their vision for their school about maths teaching
Respondent 2	Information from session 3 about implementing change because she had never done CPD on leading change before. Made her realised the amount of preparation needed to successfully implement change and has stopped her from getting frustrated when change hasn't happened as quickly as she wants it to. Identifying the key components of what will be needed to effectively implement change was very useful. This was the first time she'd had any kind of training on this and was her first time at thinking as a leader so it really upskilled her
Respondent 3	Using ideas from the session to have a conversation with her class about what makes someone a good mathematician, using Stephen Hawking as an example of someone who thought slowly and deeply and didn't necessarily get to the answers, but kept going. This set a foundation for the rest of the year. The ethos in class is now that maths is fun. The children can work systematically (year 1) to find all possibilities and show their answer in different ways. They aren't just learning maths skills but skills that are essential for other areas of life too eg resilience, flexibility etc
Respondent 3	Lots of things covered during the year made sense – lots of light bulb moments. Stand out ones include:
Respondent 3	The last virtual session on teacher learning – made a lot of sense but hadn't thought about it before

Respondent 3	Actually playing games and doing activities so experiencing for herself what the children might experience
Respondent 3	Using concrete resources – sharing the "secret" of maths with the children and helping them all to see that they are mathematicians
Respondent 5	The beliefs activity from session 1 was a great ice breaker to use with colleagues and provided a way into changing approaches to maths teaching at school – doing this with staff led to open discussions.
Respondent 5	An activity from the first or second session where action planning was done by putting activities onto post it notes to order. He used this with other subject leaders to help them write action plans for their subjects.
Respondent 6	The vision session at the start was really powerful for the school. He did the activity with colleagues and Governors – absolutely everyone bought into the vision. It's at the top of the maths policy and runs all the way through everything they do with maths
Respondent 6	Tons of things!
Respondent 6	Practical mastery ideas eg bean bag tennis, active games that enable pupils to get out of their seats and move. The practical activities he has tried with his class and shared with peers have been really popular (also colleague from group using them)
Respondent 6	Fluency – ideas from sessions about having a daily slot to practice. Having piloted it with his class to check it works, he's now rolling this out across the school, with everyone on board. They are using the fluency slot for same day intervention with a group of pupils so it has made them this about how to make this manageable eg pupil self marking. This has led to the assessment lead now revisiting the school marking policy and expectations, so a change in maths is now having an impact across the school. (I then suggested using marking stations and explained how they could work).

Specific activities (individual)

Respondent 2	Visit where we agreed she would model a session for her peers as it felt very easy to do but had a high impact. It was a real light bulb moment. She's hoping to use it regularly in her leadership time.
Respondent 2	Conversations with me as they helped her to clarify her thinking and prioritise actions
Respondent 4	Working with colleague in group (as she is so much more experienced than me – I had just finished my fifth year of teaching and when I started at this school last September it was my first school move).