

Family Learning Online During Lockdown in the UK

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Abstract

During the first national lockdown in the UK in March 2020 family learning sessions usually delivered in face-to-face groups were adapted to online learning encounters. This article describes research undertaken into the effectiveness of the interventions from the perspectives of parents and tutors. Using an action research approach the reflections and findings are explored to identify possible adaptations of teaching mathematics online in a family learning context.

Teaching and learning using digital platforms is a new experience for many tutors and learners who were pushed into using an online learning approach because of the strict limitations placed on physical social interactions. Not surprisingly participants and tutors experienced online learning as quite different from traditional face-to-face classrooms. The research identifies possible opportunities that can be developed through online intergenerational learning experiences. However, the findings also identify significant challenges when developing knowledge through technology, what Englebrecht, Llinares and Borba (2020) identify as knowledge developed collectively and described as ‘humans-with-media’. Developing new learning experiences using digital platforms requires the ability to overcome many different technological barriers and make changes to traditional pedagogical approaches while dealing with a variety of digital and conceptual capabilities of learners. This research points to the need for professional development for tutors to foster confidence developing the new skills and the knowledge needed to sustain this different learning experience.

This research makes an original contribution to mathematics research in two ways. It discusses the intersection between the different pedagogies of family learning, online learning and mathematics learning. The research also spotlights the opinions of mainly black and minority ethnic women who are experiencing family learning online for the first time, giving voice to an often under researched group of learners.

Key words: family learning; online learning; mathematics; numeracy

Introduction

During the March 2020 national lockdown in the UK, resulting from the Covid-19 pandemic, teachers and tutors had to adapt quickly to deliver courses and workshops online. This change in teaching approach enabled family learning in a small tutors social enterprise based in London to continue with their work and to support many learners during the crisis.

These events also set up many challenges and put additional demands on both tutors and participants experiencing family learning online for the first time. The initial purpose of this research was to enable family learning tutors to continue to develop online teaching with a whole range of families, including those who might be viewed as marginalised or disadvantaged, thus helping the teaching team to better understand and respond to the participants’ needs. It explores

the apparently competing demands of using a family learning approach to develop skills and knowledge in mathematics through the use of technology.

This research aims to engage with adults and families to hear their views and experiences enabling the development of a more collaborative response to future online family learning programmes, including mathematics. In this article, the term parents is used to mean any adult including parents, grandparents, guardians and carers, who have direct responsibility for supporting children's welfare.

Literature Review

This short literature review focuses on the themes of family learning, learning mathematics, and online learning. We explore the characteristics of family learning and learning and teaching mathematics, describing learning that happens with and through family members. The push to online learning during the first lockdown in March 2020 was for many parents, children and teachers a novel experience, so this research explores how learning online is different to traditional face-to-face classes and how the use of digital devices affects teaching, learning and knowledge development during family learning sessions, focusing on mathematics.

Family learning

Research indicates family learning has a very broad set of characteristics encompassing learning that happens in family contexts in their broadest understanding. Family learning focuses on supporting the skills, knowledge, confidence and well-being of families by working directly with parents, carers, guardians, grandparents, siblings and the children they care for (Brassett-Grundy, 2002). Often the learning is intergenerational, but during family learning sessions it can be intergenerational for all or part of a session, whereas sometimes it might be for adults only.

The family learning programmes run by the social enterprise involved in the research are all run by experienced tutors who usually work with families and children in a wide variety of venues and settings. The courses range from Health Literacy to practical craft activities or Literacy, ESOL and Numeracy programmes. Before the pandemic the family learning courses would be in libraries, schools, community group venues, prisons or in outside settings. Where a course is run for the parents or carers specifically there will usually be arrangements made for a creche run by professional staff.

Research by NIACE found that 'parental engagement in family learning has a large and positive impact on children's learning, giving children greater confidence and self-belief, with measurable benefits to their literacy, language and numeracy skills' (NIACE, 2013, p. 7). Other research points to the positive benefits identified by parents, for both them and their children, ranging 'from practical and tangible gains (e.g. a certificate of achievement, improved vocabulary of the child) to emotional and psychological gains (e.g. rediscovery of 'old' self, increased confidence in themselves and their children)' (Brassett-Grundy, 2002, p. 41). The NIACE research also found that supporting children can actually help parents considered 'hardest to reach' to overcome practical, financial or dispositional barriers to learning.

Teaching approaches used in family learning contexts in this research have similarities to those described by González, Andrade, Civil and Moll (2001) working with low-income and minority students in Arizona. They describe families as "funds of knowledge" and view students as repositories of diverse knowledge bases which tutors build on to 'mathematize' household practices. They argue learning is developed in "zones of practice" where:

We can invite children into a world with a concrete motivating activity in which the everyday and spontaneous come into contact with the scientific and the schooled. The dichotomy of in-school and

outside-school mathematics can be elided into a dialectical practice within which students' engagement with both the activity and the social context are foregrounded. (p. 128)

In this research the family learning sessions also seek to build on the outside-school knowledge parents and children already have as a starting point to develop a meaningful understanding of concepts identified in the school curriculum as useful in wider society. Family learning tutors often refer to themselves as “facilitators” to underline the strengths-based approaches that the family learning team use in sharing learning and supporting the identification and development of existing skills.

But Ashton (2013) also argues that family learning programs need to help parents develop ‘some knowledge of how to teach (pedagogy) as well as what to teach, to be able to support their children at home’ (p. 214). Research by Letzel, Pozasi and Schneider (2020) carried out during lockdown, supports this in that they found learning at home during lockdown was stressful for parents who were inexperienced in the range of demands of teaching, having little experience of the ‘pedagogical content for knowledge as well as an unfamiliarity of didactics’ (p. 166).

Research by Carpentieri, Fairfax-Cholmeley, Litster and Vorhaus (2011) into family learning programmes points to them needing to contribute to an even wider range of parents' understandings including the cognitive, social and emotional development of the child.

Whalley (2007) contends professionals working with parents too often assume a deficit model, labelling some families ‘hard to reach’ or assuming they have no interest in their children's learning. Both she and Morton (2010) argue for a closer involvement of parents in their child's education where educators should listen to parents' needs and ideas. The model promoted by the family learning team in this research seeks to build a closer, more collaborative relationship between the tutors and the parents of children involved in the online learning, hence this research.

While research into family learning is growing, Carpentieri et al, (2011) found it rarely explores further aspects of learning such as ‘family numeracy’ or the influence of technologies on the family learning experience. Even so, the research that has been undertaken identifies many perceived benefits to family learning which are shared between the child and the parent, even spreading to the wider community.

Learning Mathematics

Psychological research into mathematical cognitive processes by Whitebread and Bingham (2013) posit that a child's understanding of their world develops dramatically in the first four years. They contend young children learn through observation and induction, that is detecting patterns in their experiences and constructing their conceptual knowledge of the world. These are part of what they call the development of a child's executive functions that lead to habit formation in later life. They argue two- and three-year-olds are capable of understanding one-to-one correspondence and ordering, that is knowing numbers. Four-year-olds can be helped to make comparisons between characteristics such as heavier/lighter or bigger/smaller while between four and ten children can start to develop planning skills by discussing birthdays or measuring a number of sleeps until an event. They identify teachers and caregivers, such as parents, as influential in helping construct those concepts. In the UK, Ashton (2013) suggests family learning tutors should be aware of the mathematical content in both the pre-school Foundation stage curriculum and the adult numeracy curriculum. Taking into account the parents' learning needs as well as the child's. She also suggests linking content to the strands of the UK national curriculum for 5–11-year-olds, which includes: using and applying mathematics, counting and understanding number, knowing and using number facts, calculating, understanding shape, measuring and handling data.

Research into younger children's development of mathematical understanding and attitudes finds that both formal and informal family learning activities are important when developing mathematical skills, knowledge and attitudes. Skwarchuk, Sowinski, & LeFevre, (2014) research found:

Formal home numeracy practices (e.g., practicing simple sums) predicted children's symbolic number system knowledge, whereas reports of informal exposure to games with numerical content (measured indirectly through parents' knowledge of children's games) predicted children's non-symbolic arithmetic, as did numeracy attitudes (e.g., parents' enjoyment of numeracy). (p. 63)

This research points to the importance of families playing games together as well as 'doing school based learning'.

Grant (2009) argues that family learning can be an intergenerational experience when children learn from parents and parents learn from children, for example while undertaking Internet searches. He suggests parents might understand the mathematical subject content while children can explain how to utilise different digital platforms. However, this learning depends on the level of knowledge of children and parents in both technology and mathematics. As research by Civil, Díez-Palomar, Menéndez and Acosta-Irqui (2008) posit mathematical interactions between parents and children are also influenced by previous learning experiences, cultural identities and age/generation. Their research points to a possible source of tension between children and parents when there is a 'gap' in how they learned a mathematical concept. Ashton (2013) further contends parents struggle to support their children if they do not have an up-to-date understanding of how mathematics is taught and cannot relate their knowledge to the current school curriculum.

However, research (Civil et al, 2008; Ashton, 2013) also suggests parents learning current school methods is helpful to their children, improves parents' confidence, and enables a dialogue with children about different mathematical methods. Research also shows helping their children to understand the school curriculum can be a real motivating factor for parents to return to learning and can be rewarding if parents can overcome previous negative experiences (Ashton, 2013; Kelly, 2019). In family learning programmes mathematical experiences can mean teachers, parents, and children are all learners.

On-line learning

Intergenerational learning online is still a relatively new phenomenon. Research undertaken during the first lockdown in Spain where learning dialogic literary groups transferred online, observed that some families found the experience online quite supportive and emotionally reassuring to be able to retain virtual friendships (Ruiz-Eugenio, Roca-Campos, León-Jiménez & Ramis-Salas, 2020). Research by Grant also argues that families learning with digital technologies can contribute to the narrowing of 'the achievement gap for children from disadvantaged backgrounds, while developing parental skills and strengthening intergenerational relations contributing to creating cohesive communities' (Grant, 2009, p. 2). However further research found transitioning to online learning during the Covid-19 pandemic resulted in school children from disadvantaged groups engaging less with learning thus exacerbating the learning gap in children from disadvantaged homes (Catalano, Torff & Anderson, 2021; Bonal & González (2020). Nevertheless, Barr argues that media now comprise a significant part of daily experiences for young children and that 'research demonstrates positive associations between joint media engagement of age-appropriate, well-designed media content and child outcomes and negative associations between 'technoference' [where technology interrupts interpersonal reactions] and child outcomes.' (Barr, 2019, p. 344) She advocates more research into the digital ecology of the family.

Borba and Villarreal (2005) suggest that using digital tools for online learning has been viewed historically as two distinct concepts whereby technology either ‘serves’ humans or dominates them. They posit that learning on and through computers influences the way humans understand things, so knowledge produced is a result of a collective process of humans and things. They argue that learning online is not only influenced by the technology but also influences the way we use the technology to think. Therefore, our understanding is an ‘intershaping’ relationship between humans and technology.

Englebrecht, Llinares and Borba (2020) further contend that the Covid-19 pandemic is encouraging more educators to use online learning thus developing a greater understanding of this relationship, creating what they now call knowledge that is developed collectively as ‘humans-with-media’. They see humans-with-media affecting education, reasoning the internet is changing the way generations learn so that the traditional approach which is teacher driven, where the teacher is the source of knowledge and students passively absorb ideas (known as pushing knowledge) is being changed to a more student driven approach where students take control of the learning process—referred to as a pull process (Bassendowski & Petrucka, 2013). For example, art is a subject that traditionally utilises the pull approach to learning, requiring students to explore media and resources and bring those ideas back to merge with their own creative thinking to develop new art forms. Mathematics, on the other hand, traditionally lends itself to a push approach to developing knowledge where the teacher introduces the topics, methods and approaches used to solve problems in particular sequences. Online learning offers opportunities to change teaching approaches allowing students to select and transform information, enabling them to explore ideas that are interesting to them thus designing their own curricula. Bassendowski and Petrucka, (2013) argue learners can do this in an online environment that ideally supports collaborative discussion opportunities which they propose leads to more critical thinking, encouraging a more independent learner. However, utilising the new set of skills and knowledge that technology offers mathematics teachers may be contentious and require significant professional development, something that was not available during the first lockdown.

In her research into learning during lockdown in Wales, Lyakhova (2021) uses the term ‘remote teaching’ to describe learning not being undertaken face-to-face. She suggests remote learning describes a wide range of different models. These include ‘blended learning’, incorporating both online and face-to-face learning as well as ‘flipped’ classes, where topics are introduced to individuals through online videos, before a face-to-face discussion with other learners. Yorganci (2020) argues that introducing real life problems through short videos and quizzes before the class promotes discussion into understanding when the class meets together online. However, Yorganci’s research (2020) was undertaken with older learners whereas Lyakhova (2020) points to the very limited amount of research into remote learning, especially its impact on younger learners.

When undertaking research into remote teaching Lyakhova (2020) also describes teachers as having to plan for a ‘social, cognitive and teaching presence’ (p. 18). This idea builds on research into online learning labelled a ‘community of inquiry framework’ by Garrison and Arbaugh (2007) which explores changes into each ‘presence’ when engaging with new groups online. Lyakhova (2020) argues parents of younger learners may have to take on a more ‘social’ role of mentor, encouraging children to concentrate, while the tutors focus on teaching the subject content. She suggests the younger the learner the more ‘social’ support they may need. Garrison and Arbaugh (2007) also point to the need for more research into changes in on-line teaching approaches, exploring possible changes in the balance between facilitation and direct instruction.

This literature review necessarily covers a range of ideas that represent an intersection of pedagogies of family learning online focusing on implications for mathematics teaching. The

review does not claim to be comprehensive but brings together seemingly diverse concepts in order to explore the challenges and opportunities arising from using a family learning approach delivered through digital mediums to develop knowledge and skills in mathematics. Family learning is aimed at parents who are ready and interested in learning how to support their child's development. Parents have to give time to the learning activity while finding the physical space for children to learn and the digital devices required to do that learning as well as pay for connectivity. These pressures can be exacerbated if a household includes a number of children of different age groups which requires differentiation of that social support for teaching. These extra demands on parents' time and resources proved to be difficult for some, especially during the first lockdown.

The research also shows that as well as putting new expectations on parents and children, learning mathematics online also puts new demands on tutors who are expected to utilise and adapt to digital tools and platforms to promote learning. Developing children's mathematics skills and knowledge challenges tutors who have honed their teaching skills in the physical classroom to modify, or even revise completely, those approaches to adapt to a digital environment. The fact that the online world might often be better understood by the younger learners than their tutors also puts extra pressure on tutors hence has implications for their professional development. Being pushed or forced to undertake learning online places new demands on parents, children and tutors and requires further research to help understand the implications and develop support strategies for all involved.

Methodology

The research team used an action research approach to engage with adults who were participating in a range of online family learning courses provided through a small social enterprise in London during lockdown (March-April 2020). Action research is used widely in UK Education to encourage a reflective cycle in teaching, starting with identifying an issue, moving on to gathering information in order to interpret the data and then analysing the evidence before finally evaluating the results to recommend improvements (McAteer, 2013).

In this research the aim is to listen to the ideas of parents involved in the family learning programmes which were developed for face-to-face teaching but moved online at short notice. The tutors were keen to listen to the experiences of the parents and consider how the online learning environment might be improved. We wanted the words of interviewees to lead our analysis and grounded our theory in words of the interviewees which enabled us to 'follow leads that emerged out of the data collected' (Charmaz, 2006, p 14) while systematically building theory or ideas from data.

Research sample

The research sample of participants contained 20 parents or carers and three family learning tutors. The carer group consisted of 19 females and one male. Eight people in the sample classified themselves as Black African, four as British Bangladeshi, three as other white, two as other Asian, one as white British, one as Black Caribbean and one did not classify themselves. Six of the adults in the sample were between 16 years and 25 while 14 were aged between 25 and 36 years. A total of 48 children are connected to the adults involved in the research, a majority at primary school or nursery age, 34 were below 11 years old 25 of these were below six years old. All of the participants live in South London, in the UK.

The three family learning tutors were all involved in teaching online during the first lockdown. They are part of a group of five family learning tutors involved in teaching through the social enterprise, all female with a broad range of skills and teaching experience. In the

sample, one of them describes herself as Black Caribbean, the other two as White British. Most of the tutors live and work in London boroughs although some are also involved in planning courses that would be run elsewhere in the country. All tutors have the Initial Teacher Training qualifications for adults and some are also qualified to teach children.

Contacting participants for the research

Invitations to join in this research were sent out through a variety of networks to ensure a sample size that was authentic and credible. Authentic in the sense that it is important to recognise various viewpoints that stakeholders hold within different social worlds, and by so doing, aims to arrive at better understandings (Bryman, 2012, p. 392). Authentic also in that this research seeks to give a voice to a perspective less often heard, that of parents and carers experiencing family learning. Credible in the sense that we were able to carry out in-depth interviews with twenty carers and three tutors to gain multiple perspectives that ‘reflect participants’, researchers’ and readers’ experiences with a phenomenon’ (Corbin and Strauss, 2008, p. 302).

Lefever, Dal and Matthíasdóttir (2006) found online requests for data were variable and often had low response rates. In this research invitations varied in that they were given to parents who were participating in the online courses in children’s schools, children’s centres and libraries. They were also given through word of mouth from learners on a range of programmes and through social media. Their engagement in the interviews was entirely voluntary. The list of courses, their purposes and timings are listed in Appendix 3, along with the number of participants from each programme who participated in this research.

The participants in the interviews were identified and recruited by the online family learning tutors. This method of sampling was purposive (Bryman, 2012, p. 422) in that adults interviewed fulfilled a particular set of criteria, essentially that they attended the new online family learning courses, which started during lockdown in March 2020. Two of the family learning teachers also joined the research team and could be seen as ‘gatekeepers’ to accessing participants. Atkinson (1986) warns against a reliance on ‘gatekeepers’ for the research data as they could be engaged in ‘impression management’ where tutors could be hoping to choose interviewees who would give a good impression of the work they did and the results they achieved. However, in this research the questions focused on more general experiences of online learning and learning mathematics. The research team also included two interviewers unknown to the respondents, while others completed online questionnaires hence these participants were less open to any management of data or bias. The identification of specific courses families attended is used to provide background context to the main purpose of the research. See Appendix 1 for the full set of questions.

The interview requests and outcomes were as follows: 11 were asked verbally during an online course or workshop, all of whom agreed to participate but only seven resulted in interviews, with one online completion. There were 25 requests to participate made by email, 12 agreed but again only seven resulted in interviews, two members preferring to complete the questionnaire online. A request was sent out to all of the people who attended or interacted through Facebook interventions but this resulted in only three completions of the online questionnaire.

Collecting the data

The research team developed the questions for the interviews and one team member put the questionnaire online. At the beginning of each interview and written at the top of the online questionnaires was a statement explaining to the interviewee the purpose of the research and that we were following ethical guidelines on data collection (see Appendix 2).

No data was collected to indicate how long self-completed online questionnaires took but the semi-structured interviews took 30 to 45 minutes. Each person who participated in the research answered the same set of questions and was assured anonymity. The technology behind the online set of questions also enabled the team to collect and store the data anonymously, identified only by a time and date.

As we were undertaking action research, we have also included reflective pieces of narrative by three of the five family learning tutors who taught online and volunteered to be part of the research. This enabled us to perform a type of triangulation of the data. In action research social phenomena can be cross checked from different sources and used to compare and contrast different perspectives as well as identifying pointers for future research (McAteer, 2013).

The research team

The research team consisted of two family learning tutors, one tutor specialising in dyslexia and literacy and another tutor who specialises in numeracy and mathematics. All the research team were involved with the collection of data and analysis. The data collected was qualitative and the analysis of the data was a collaborative endeavour. The research team members worked together to identify themes in the data by looking for repetitions in responses, similarities and differences in topics were identified across the sources as well as metaphors and analogies used by participants to express their thoughts (Bryman, 2012, p. 580). This process of research and analysis helps to break teacher isolation fostering a culture that promotes learning for all (Sagor, 2010).

Findings and Analysis

In this section, we describe the findings from the research in relation to online learning during the March to April lockdown in the UK. We group the data into sections, initially focusing on the subject area of mathematics, then exploring the adults' general learning experiences, followed by tutors' reflections on their experiences. This research has contributed to the teachers developing online family learning experiences that contributes to the development of a joint curriculum with parents.

Focusing on mathematics

Half of the participants in the sample (10 out of 20) had accessed at least one mathematics website during lockdown. The websites used were from a wide range focusing on mathematics for younger learners, which included school sites. Two of the families paid for instructions through commercial websites, one explaining that the approach "...is more formal learning, set papers are given to work on every day for a week and then they provide zoom sessions to go through the work." One parent chose particular websites because "I find these websites very good and my daughter likes them" while another said the website was "great because the activities are not too long, just right and easy enough for the children to do without support." Others had difficulty finding what they were looking for online, as one explained:

Numeracy was what worried me the most about teaching my children at home. It was difficult to find free resources online. There were no short/sharp courses to upskill my maths but luckily my brother has stepped in.

This quote indicates a need for some parents to have further support and guidance when trying to assist in their children's mathematics development. As another explained:

Sometimes he [her son] doesn't understand the maths so I have to use the methods they use [at school or online] to help explain it to him.

Another spoke about being challenged with explaining more complex mathematical concepts, saying she was happy with addition and subtraction but did not know how to introduce multiplication. All these statements indicate adults are aware of the need to develop their own knowledge and understanding of mathematics in order to support their children. The notion of mathematics being a subject that causes some anxieties for parents was indicated in the first long quotation above but is explained more explicitly by another who said:

I don't like online learning and mathematics is always a bit painful for us but BBC Bitesize maths games are good.

This statement is interesting, although the adult expressed really negative emotions towards mathematics, they found BBC Bitesize games 'good', indicating the possibility of ways of engaging learners to overcome their anxieties when motivated to learn to help their children.

These few quotations provide further data supporting research indicating that parents can overcome their maths anxiety when motivated by their children (Kelly, 2019) and become learners themselves (González, Andrade, Civil & Moll, 2001). What might be viewed as more concerning is that only half of those interviewed accessed any mathematics resources online. The variety of responses, even within this small group, indicates the need for further research to try to develop meaningful support for families to extend their mathematics skills together.

Parents', carers' and children's experiences

A majority of parents and carers (17) responded positively to a question about the usefulness of learning online, while 15 spoke about learning online helping both their own and their children's confidence grow. This indicates an appreciation by parents of both themselves and their children as learners. A small but significant group (4) found the loss of physical contact with adults in the family learning context (i.e. the community of learners) more difficult.

Five parents stated they enjoyed learning with their children and developing an understanding of how to support children's learning. For example, one said she liked "spending more time with my children and I learnt from them sometimes." The families enjoyed sessions that were interactive finding them motivational and three stated they enjoyed the 'warm up' activities at the beginning of the sessions. As one said, "Early in the morning you don't feel like doing much but felt ready afterwards." While another indicated she liked it when the tutor had an activity planned for the time spent waiting for others to join the class. This last notion indicates a useful approach for planning future sessions.

Participants also valued the regularity of sessions during lockdown, as one explained it "made me realise that for my children a zoom session with their teacher at least once a week would be really good." Another spoke about how the family "look[ed] forward to the next [session]," while another described the sessions as a much needed "break from the monotony."

At least five participants highlighted the 'teaching role' of online tutors as important during these sessions, ensuring a lead and purpose to the sessions. Teachers influenced children's behaviour by giving clear guidance on activities and resources. As one parent observed "...my daughter will do more for the online teacher than for me, as they want to impress her." Five spoke about how having to manage their children's behaviour and how it was affecting their personal learning. As one explained "If I want to learn something, they distract me" and another said it was difficult "...keeping my children quiet." Yet another said it is "...difficult to keep them engaged", while another pointed to the "...need to be around constantly to support children with learning and technical difficulties." All these quotes point to the need for parents to develop their own skills in providing 'social' support and motivation for their children's learning. In the family learning context tutors aim to focus on parents' understanding of concepts and enable those parents to support their child's learning.

When considering how to improve both adults and children's online learning experiences participants asked for more 'talk time' in future sessions; 10 wanted more time to share experiences with other parents, eight wanted more 'talk time' with the teacher, two others suggested it would be good to give the children more 'talk time', while two others suggested having longer sessions to include breaks for talking. This research was undertaken during the first lockdown when there was little movement outside the home. This need to talk can be linked to the 'social' side of learning with peers, i.e. the learning community, which was missing from the online experience where short informal chats are not possible.

Further challenges to the 'social' aspect of learning were identified by six people who spoke about the trials of using technology and Zoom when interacting with others. Some participants reported they found the medium awkward, one explained "You can't read people's feelings and emotions." Another described the problem as "the conversation in class can't flow so easily online, it can get noisy if people aren't muted during class." Psychologists talk about the lack of ability to receive cues through zoom which leads to participants in meetings 'not feeling "in tune" with speakers, so their interaction is not smooth.' (Bailenson, 2021, p. 3)

One participant who was unable to access a computer pointed to an important limitation when learning online, when she was forced to attend the sessions using only a smartphone because "It was much harder to follow the course on a small screen and take notes at the same time."

Overall, the parents and carers responses indicated they valued the sessions with the tutors online during lockdown, suggesting approaches and activities that could be further developed in future online family learning courses. However, parents also pointed to some of the challenges undertaking family learning through technology, the need for more 'talk time' suggests the limitations of the social experience for adults and children. The difficulty with reading peoples' emotions also leads to adults having to learn new ways to interact with other parents and their children. All of these issues were further exacerbated when there was restricted access to appropriate digital devices.

The responses also highlighted the need for parents to recognise and take on a social role to support the teacher when their children were learning online. Parents themselves spoke about having to learn more about 'how' their children learn, in order to support the child's understanding of particular subject concepts, which accords with the family learning ethos. They also spoke about the need to motivate their children to attend sessions as well as encouraging them to stay focused, again reinforcing the important social role that parents play in online learning.

Tutors' reflections

As part of the evolving collaborative approach to developing online family learning courses, three of the all-female family learning tutors who engaged in the online learning experiences volunteered their reflections. The tutors found moving to the remote delivery of courses and workshops as "fun but also challenging". They reported being inspired when observing the motivation and determination of parents' willingness to adapt to online learning.

However, the tutors were very aware that teaching online during lockdown meant that while some participants had entry to courses who might not have had access previously, it also meant that learners with no access to the internet or digital devices were unable to engage with the family learning programmes online.

Tutors reported finding many differences between teaching face-to-face and online. They spoke about the need to engage and understand the technology and how it changed their ability to communicate with people and children, in the first instance the ability to develop an immediate

rapport is more challenging. In practical terms, it is harder to work on a one-to-one basis with learners, to help them develop their skills.

One tutor stated, “If a learner did not want to be seen and the screen is turned off, on Zoom, then it is impossible to see facial expressions and limited levels of engagement.” This is one of the barriers created by digital platforms such as Zoom. Tutors also spoke about finding it impossible to have spontaneous private conversations with students unlike the classroom. They found it difficult to take a learner to one side to discuss a particular issue, even with breakout rooms. If this was needed the tutor had to arrange another meeting outside the session. Because only one person can speak at a time online, discussing a topic in pairs or small groups is more difficult unless breakout rooms are used, even then some tutors found that difficult to manage as they can “only be in one room at a time”. The tutors found this process led to less interaction between the learners and less class discussion in general, tending to make the pedagogic style more teacher focused.

All tutors said they found online teaching more difficult than face-to-face and had to find inventive ways to get to know individual learning needs within the group and to build trust. Differentiating between individual learners' requirements and providing additional support to meet their needs was problematic as it tended to disturb the rest of the class and disrupt the group dynamics. This became very apparent when intermittent internet connections resulted in some individuals missing part of the session while they re-established the link. Providing individualised catch-up for those who missed sections of learning, through no fault of their own, became problematic.

A general reflection was how teaching online is more tiring than face-to-face. One suggestion was that sitting in front of a screen was difficult for those who like to move around when teaching. Psychological research points to “Zoom Fatigue” being a product of unnaturally long eye contact with strangers and the lack of non-verbal behavioural clues normally picked up when working in groups (Bailenson, 2021).

Completing forms for administrative purposes also had its challenges as many participants did not have printers or scanners. In response tutors tried to use Google forms, which were easier for the learners to complete but there tended to be fewer completions. There may also be privacy issues related to putting data into online forms.

In this first lockdown, many tutors rose to the challenge and moved their classes online but the findings suggest they had little available professional support to develop their own online teaching skills. Their willingness to try to sustain a link with adults and their families to continue learning during lockdown was commendable. Inevitably, the limitations on the availability of technological devices and connections took their toll for learners and tutors. The novelty of adapting to learning through technology put limitations on the tutors' ability to manage the social dynamics of the group, restricting the more personalised and differentiated encouragement of adult learners and their children enabled in a classroom.

Discussion

Unsurprisingly the use of technology in family learning programmes, during a national lockdown, was a mixed experience for families and tutors. The research sample was restricted to only those people who had access to digital devices and the Internet. The 20 learner respondents offered an insight into often unheard voices and gives the research an important perspective, even if the sample is relatively small

Access to digital devices and connectivity was an issue for tutors and participants. Intermittent access to the internet caused disruption while tutors and learners may have had to

learn how to use new video-conferencing platforms and apps which also posed their own challenges, as participants had to get used to different protocols and approaches to teaching and learning necessary to have successful online learning experiences. Nevertheless, of those learners who could connect, the majority enjoyed the interaction and the chance to engage with others, which was important for their wellbeing.

Learning online and supporting families in remote locations meant family learning tutors had to adapt their teaching and learning approaches. Tutors had to manage technical aspects of new software while trying to develop parents' ability to support and motivate their children's learning. All of this while also assessing adults and children's learning needs. Tutors wrote about their experiences of working with families online as being varied, pointing to difficulties of "reading" how individuals found the sessions while using Zoom. One tutor reported she was able to assess participants' learning needs because the classes were smaller than usual, however all tutors reported the difficulty of trying to work one-to-one with parents. Hence, the Covid-19 pandemic is changing teaching approaches 'pushing' (Morton, 2010), participants and tutors online to develop as 'humans-in-media' (Englebrecht, Llinares & Borba, 2020). Recognition of the demands of this new development and its impact on teaching and learning is not yet fully appreciated.

As described, mathematics traditionally lends itself to a 'pushing knowledge' model, online family learning lends itself more easily towards a 'pulling knowledge' model (Bassendowski & Petrucka, 2013). For example, tutors can encourage parents to use real objects from their homes, such as identifying balls as spheres, to help engage younger learners. Tutors teaching family learning mathematics also have a real opportunity to develop creative and collaborative new ways of learning mathematics, for example, signposting parents to useful websites which they can 'trust' or exploring the potential of those websites identified by parents. Investigating websites and the different ways they try to teach mathematics could also provide opportunities to explain the reasons why methods exemplified on some can support or even confuse their children, thus leading to parents' deeper understanding of how knowledge is developed.

However, in this research the tutors wrote about finding the technology created less social interaction between the learners and less class discussion in general, tending to make their pedagogic style more teacher focused. This is a point of interest as it seems to contradict the research that online learning offers opportunities to 'pull' knowledge from learners as opposed to 'pushing' knowledge into them. However it further accords with findings by Garrison and Arbaugh (2007) suggesting a possible change in the balance between facilitation and direct instruction that could be explored in further research.

While children are growing up in a technological world their parents and grandparents are learning for the first time how to adapt to the online world. The need for parents to play a supportive social role in their children's learning experience is to be expected but research suggests this role may change as children grow older. A key aspect of good family learning is that parents can support their children's learning without being dependent on a teacher/tutor. However, when learning mathematics, especially as children age or parents are less confident with concepts, parental roles may change from supporting teachers in early years to focusing more on motivating children to learn while parents themselves become learners. Indeed, expectations of both parents and tutors about their roles may change throughout online learning sessions, which would contribute to the challenges faced during learning online and points to the need for further research.

Conclusions

The lockdown experience thrust upon UK society created many problems but also pushed all generations to develop their online presence. This research explores the experiences of family learning tutors and parents who rose to the challenge to develop online learning and identifies the important benefits as well as challenge experienced by a group of mostly minority background women learners (who are less often researched but are involved in family learning). Consequently, this article explores an interesting intersection of three pedagogies: family learning, online learning and the development of mathematical understanding.

The research identifies a need for further investigation into the new demands on teaching and learning through technology, including ways to overcome the social and psychological barriers experienced by both learners and tutors in family learning contexts. Additionally, the limitations and barriers in digital access are exposed. Nevertheless, the significant part that media now plays in children's daily lives can offer opportunities for collaborative intergenerational online learning for families as well as possibilities for change in mathematics teaching and learning. This highlights the growing need for research into the digital ecology of family learning, especially in mathematics education.

The findings in this small-scale research project underlines the need for further research into opportunities that technology offers to develop new approaches to learning online both in the family learning approach and the development of mathematics skills and knowledge. However, it also points to the need to support both tutors and parents to develop the skills needed for successful online interactions. Such research would inform teacher training courses in new pedagogic approaches essential to the successful development of online learning strategies for the future.

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Appendices

Appendix 1 Family Learning Online Survey Questions

- 1.1 What do you use for online learning? (desktop, computer, phone, tablet, laptop)
- 1.2 Did you have any difficulties accessing the courses?
 - 1.21 If you had difficulties, what were they?
- 1.3 Do you have a printer?
- 1.4 What age range are you in?
- 1.5 What age/s of child/ren are you supporting?
- 1.6 Do any of your children have any special needs or disabilities?
- 1.7 Any additional comments?
- 2.1 What was the most useful thing you found learning online? (or what did you like most)
- 2.2 What was the most challenging thing you found about learning online? (or what did you like least?)
- 2.3 Is there anything that could have made the experience better for you or your child/ren?
- 2.4 Any additional comments?
- 3.1 Which LU activity did you attend? (tick all that apply)
- 3.2 What made you choose LU online activities?
- 3.3 Which online activity / activities did you like the most or find the most helpful?
- 3.4 Which were the least helpful?
- 3.5 Do you think you or your child/dren have developed confidence through online learning?
- 3.6 What other courses would you like? (e.g. art, maths, healthy living, history, science ... other...)
- 3.7 Do you think the contact with LU has been useful for you emotionally or helped your wellbeing during lockdown?
- 3.8 Any additional comments?
- 4.1 Have you done any other online activities with your child/dren during lockdown, and if so, what?
- 4.2 What do you like about online learning courses with your child/ren?
- 4.3 What would improve your online experience? (e.g. more talking time with other parents, more talking time with the teacher...other ...)
- 4.4 Have you ever used free maths materials online?
 - 4.4.1 If yes, which materials / websites?
 - 4.4.2 If no, any particular reason?
- 4.5 Any additional comments?
5. Is there anything else you would like to say about supporting children's or your own learning during lockdown?

Appendix 2 Ethical statement

Interviewees had the following statement read to them before undertaking interviews or available to read prior to undertaking the online questionnaire.

Thank you very much for agreeing to take part in this research interview about your experiences of learning online with your children during lockdown. The research is to help Learning Unlimited tutors to understand better what you thought were helpful online activities and what was less helpful. This will then be shared with colleagues to help improve the content of our courses, from your point of view.

All of the information you give me will be anonymised and should you decide to withdraw your answers you will be able to do this up until August 30th and your answers will be removed from the data. We will not share any of your personal data with any other organization.

All of the data collected will be held anonymously and kept under secure conditions. The data will be destroyed at the end of the research project.

Are you still happy to go ahead with the interview?

Appendix 3 Online Learning programmes attended by participants in the survey

Online programme Title	Time /length	Participants	Purpose	Number involved in the research
Teaching Assistants Award (leading to L2 City & Guilds qualification)	1.5 hour sessions, twice a week, in the mornings 15 week course.	Parents only.	Learning about schools as organisations, child development, communication strategies, safeguarding and welfare, equality and diversity.	4
Helping My Child with Reading and Spelling	1.5 hour sessions, once a week in the morning 5 weeks programme	Parents only.	Learning about how children learn to read and spell and how to support them	11
Family Fun at Home	1 hour sessions in the afternoon for 5 weeks	Parents and children together.	Fun learning activities to encourage adult-child interaction, learning through play, routines and positive behaviour	6
Various one-off arts and crafts workshops listed below	1 hour during the school day	Adults and children	To encourage positive adult-child interaction, decrease social isolation and share creative skills.	
Junk Modelling Workshop				5
Handful of flowers				3
Puppet Making Workshop				2
Picture This Workshop				1
Monster Making Workshop				1
Cityscape Workshop				1
Facebook Group				4

The mathematical content of each programme was embedded into each activity and this varies with every context, for example length measuring and counting numbers would appear in 'Puppet Making' and other practical activities. In 'Family Fun at Home' numeracy is incorporated through weight and measurement and is involved in food preparation and games as well as for the curriculum in the 'Teaching Assistant Award'. The Facebook group were signposted to various numeracy websites.