
BSRLM Summer 2021 Abstracts: Day Conference

Saturday 5th June 2021



**British Society for
Research into
Learning Mathematics**

Plenary

Barnes, Alison

School of Education

University of Brighton

Alison is a winner of the Janet Duffin award for her paper 'Perseverance in mathematical reasoning: the role of children's conative focus in the productive interplay between cognition and affect'.

Mathematical reasoning: perseverance, enjoyment and active goals

Mathematical reasoning requires perseverance to overcome the cognitive and affective difficulties encountered whilst pursuing a reasoned line of enquiry. I sought to understand how children's perseverance in mathematical reasoning (PiMR) manifests in reasoning activities, and to examine how PiMR can be facilitated through a focus on children's active goals.

The study focused on children, age 10–11, selected for their limited PiMR. Data, collected in two English schools by observation and interview, related to children's cognitive and affective responses and their active goals. A tripartite psychological classification was used to analyse children's cognitive, affective and conative responses in activities involving mathematical reasoning.

In this talk I explore two findings relating to persistence and enjoyment; whilst often perceived to be positive and desirable in the learning process, these attributes can act as a barrier to persevering in mathematical reasoning by reinforcing a focus on habitual behaviours and inhibiting self-regulation.

*Research papers, workshops and working groups***Barmby, Patrick; Foster, Colin; Jones, Ian; Kelly, Joel; Milinkovic, Jasmina*****Using comparative judgement to measure pupils' attitudes to mathematics. (Presentation)***

Research has highlighted drawbacks to quantitative approaches to measuring attitudes to mathematics, and suggestions made to move beyond using simple quantitative measures, perhaps through the use of more open questions. We therefore investigated whether comparative judgement provides a way of 'scoring' these open responses. A study was carried out in one English primary school with 187 pupils from Years 4 to 6. Pupils were asked to 'Write about your attitude to mathematics'. Teachers from the school comparatively judged the pupils' scripts. Alongside this open question, pupils also completed a 12-item Likert scale questionnaire also measuring attitudes towards mathematics. Finally, following the judging, the teachers involved were asked to complete a questionnaire asking for their views on the positive and negative aspects of using comparative judgement to look at pupils' attitudes towards mathematics. In this presentation, the results from the comparative judgement assessment and the attitude questionnaire will be summarised and compared, including reliabilities and correlations between the two, to examine the validity of the comparative judgement approach. In addition, the results of the teacher questionnaire will be summarised. Based on these results, we will put forward possible advantages and disadvantages of using a comparative judgement to measure pupils' attitudes to mathematics, and suggestions for improving the process in future studies.

Barrow, Ellen; Golding, Jennie; Grima, Grace***'It's been worth the effort': Primary school teachers learning to teach mathematics remotely during the pandemic. (Presentation)***

We report on findings from a 2019-2021 study of a 'mastery'-oriented primary (R-year 6) mathematics resource in England. The study follows 40 classes of 2019-21 (initially) Power Maths-using year 1,3 and 5 children and their teachers over two years, exploring teacher and pupil use and the impact on mathematics learning. We draw on March 2021 survey and interview data from teachers of years 2,4, and 6, and school maths coordinators, across a fairly representative sample of schools. These data span the general return into school from the early 2021 lockdown period, and allow us to compare and contrast teachers' approaches across the two pandemic-related lockdown periods. Most, but not all, teachers showed a significantly wider range of, and confidence in, remote learning practices. They expected more, and active, new learning, sometimes at the 'normal' pace, rather than aiming just to consolidate prior knowledge. Many actively selected the most appropriate topics for home learning, substantially increased 'live' teaching, and found ways to more proactively monitor work. Some reported children thriving on such approaches. Despite this, some challenges persisted. Teachers widely struggled to achieve effective formative assessment, with knowledge of parental support ambiguous and emerging gaps in breadth and depth of many children's mathematical progress still a major concern for many.

Birkhead, Amy

Exploring the identity negotiation of early career mathematics teachers. (Presentation)

Becoming a mathematics teacher is a period of intense identity negotiation. In England, early career teachers' work is specified through detailed teacher standards and monitored and audited through performance management systems. Such high-stakes assessment of teachers' practice means many early career mathematics teachers have to make difficult choices between pleasing the cultural gatekeepers of the school and their own ideals about effective mathematics teaching and learning. In this way, the school culture coupled with workplace opportunities and constraints on pedagogical choices impact on an emerging professional identity. This study aims to understand how secondary mathematics teachers negotiate their identities during their first two years of teaching by exploring the internal forces that shape their understanding of being a mathematics teacher while navigating the social and cultural conditions of schools. In this presentation I will provide an overview of the design of this study and how teachers' stories will be captured to develop a narrative inquiry. Through exploratory interviews, written personal reflections and the collection of artefacts, the teachers' histories, beliefs about mathematics and the context in which they work will be examined. This allows further exploration of any tensions that teachers face as they are socialised into their school settings, and which can contribute to an emerging professional identity.

Clarke, Laura

'It's not worth trying to understand the problem, it doesn't help': an examination of children's approaches to solve word problems. (Presentation)

It has long been agreed that problem solving is at the heart of mathematics. Its prominence has been retained in each iteration of the national curriculum and revision of SATs. Since Polya first proposed his problem-solving framework in 1945 there have been myriad other frameworks and problem-solving procedures taught to children intended to develop efficiency in solving problems. Recently attention has shifted to reasoning and problem types suited to bar model solutions. Although SATs tests provide data on how successfully children solved problems, teachers have limited insights into what children think about when deciding how to solve problems and the extent they match what they have been taught. My research involved 29 Year 5 children working at ARE attending 9 schools across 3 LAs. It examined what children did when solving word problems addition and multiplicative reasoning problems and their justifications of their approaches. The evidence collected showed that the majority of children relied on inefficient and inappropriate procedural strategies that deliberately ignored the problems' context. This disassociation resulted in very time consuming, erroneous solutions. However, my research also identified simple interventions that support children to be more successful problem solvers.

Cosette Crisan; Bretscher, Nicola; Clark-Wilson, Alison; Geraniou, Eirini. (Convenors)

Presenters: Rosa Archer; Ebert Gono; Andrew Neate; Chris Shore (Presenters)

Learning from the pandemic: Capitalising on opportunities and overcoming challenges for mathematics teaching and learning practices with and through technology (Working Group)

This working group will meet for the second time. Four further case studies will be presented, each exploring at least one of the three pedagogical themes of this group:

1. Introducing and developing understanding of new topics: A teacher's planning for using Desmos to teach an A-level topic remotely (Chris Shore)

2. Managing interaction and communication: Learning from students' reflective statements on their learning in remote online lessons' (Ebert Gono)

3. Managing interaction and communication: University mathematics lecturers and A-levels teachers' evolving pedagogy during the pandemic (Andrew Neate)

4. Assessing learning and teaching: A teacher educator adapting to online learning environment, including carrying out unseen lesson observations (Rosa Archer).

In the Autumn we will work together with all the seven case studies presented so far to draw on research and theoretical frameworks, and to identify possible foci for future research directions.

Gifford, Sue; Ineson, Gwen; Marks, Rachel

Early Years and Primary Mathematics (EYPM) (Working Group)

This will be the eleventh meeting of the Early Years and Primary Mathematics (EYPM) Working Group. This will be an informal meeting where: We will be sharing updates since our last meeting in March 2021. Sue Gifford will be discussing the work of the ECMG on developing a spatial reasoning trajectory (see: <https://earlymaths.org/>) as well as the new DfE Early Years resources on spatial reasoning. Nancy Barclay, Alison Barnes and Rachel Marks will be briefly updating the group on their research project on the use of textbooks in primary mathematics, particularly with respect to gaps in the literature / knowledge base. We look forward to welcoming both previous and new attendees to our meeting.

Helme, Rachel

Listening to Claire: Analysing one student's story told in the context of resitting mathematics in a post-16 college. (Presentation)

For students who are labelled as low attaining in mathematics, their identity work is often represented through the lens of another, such as a teacher or researcher, and therefore the voice of the students themselves can be marginalised. However, there is a possibility of an illuminating narrative that may be found when attention is given to their own stories (Helme, 2019, 2020), but in order to listen to this alternative view, researchers need consider methods that foreground the student's own voice. This session presents the initial findings relating to one participant, Claire, from a study into the stories told about and as identity work in the context of low attainment. Claire was a 17-year-old student who attended a post-16 college and, due to be allocated a grade 3 in her GCSE exam, had to attend mathematics resit classes in order to try and improve her grade. Using interview data gathered over a period of six months, the story she told was analysed through the use of a poetic structure called a I-poem (Gilligan et al., 2006; Helme, 2021) in order to foreground Claire's first-person voice. The chapters of the story lead the listener through the developing journey as Claire engages with the teaching and learning of mathematics in a different learning context compared to that of her previous schooling.

Hilton, Caroline; Saunders, Jo

Connecting music and mathematics: exploring the professional development of primary school teachers in the English context. (Presentation)

Building upon previous research (Viladot, et al., 2018) a small-scale qualitative study was established to work with generalist class teachers in primary schools in London, UK. The research explored how music and mathematics could be co-taught so as to support ongoing professional development.

Early findings suggested that the co-teaching of music and mathematics supported: i) a meaningful context for exploration and mastery within both subject domains; ii) extended dialogues within both subject domains; iii) collaborative dialogues between teachers focused on problem solving and learning in preference to previous foci around content and repetition; and iv) a need for the further examination of the impact of teacher identity on issues including planning, craft and professional knowledge and the notion of an 'expert'.

Jacques, Laurie; Drury, Helen

Using a Lexicon for Deep Mathematical Learning to construct an assessment framework to support comparative judgements of the quality of learning additive relations. (Presentation)

We conducted a small-scale mixed methods study with 60 Y2 pupils from 6 schools for Mathematics Mastery, to compare the quality of learning of additive relations in Y2. Following a small-scale literature review of deep learning of mathematics, we developed a 'lexicon for deep mathematical learning' (LDML) to facilitate teachers' discourse when determining the quality of their pupils' mathematical learning and to construct an assessment framework for different areas of mathematics. We then used the LDML assessment framework in the context of additive relations. Word problems were designed to assess combining, augmenting and comparing. The pupils were given 4 word problems in an out-of-class setting, led by the first author. The mathematical quality of the pupils' recorded work was assessed using comparative judgement. The judgements yielded high levels of reliability, indicating that the LDML was helpful in constructing an assessment framework that supported teachers to make comparative judgements about the quality of their pupils' learning of additive relations.

Lee, Stephen, Deko, Jo, Hussain, Iram

Breaking down the barriers to offering Level 3 Core Maths: findings from interviews with large A level providers. (Presentation)

Almost 12,000 students in over 600 schools/colleges now study Level 3 Core Maths. The uptake has grown steadily since its inception in 2016, but there continues to be barriers for some institutions to offering the post-16 qualification. As part of the work of the Advanced Mathematics Support Programme, a small-scale study was conducted into large A level providers who did not offer Core Maths. 66 large A level providers were in scope of the study, and this paper reports on feedback received from 20 interviews and 10 survey responses. Findings show that a major barrier within this type of institution is that many students are already taking alternate level 3 mathematics qualifications, i.e. A level Mathematics. Other hurdles are connected to this, such as timetabling and teacher shortages. Two additional concerns centred on the funding associated with the qualifications, as well as a lack of university recognition for Core Maths.

Hataru, Vesife

The Structure of Specialisation in STEM Education

For over a decade now, there has been an increased focus on the teaching and learning of STEM both in schools and universities. The literature on the impact of STEM education on student learning outcomes, however, presents mixed results, and what kind of STEM specialisation is valued and emphasised within STEM education is less known. Useful theoretical perspectives and analysis approaches are needed, in order to initiate effective interventions that can result in improvements in student learning outcomes. In previous research, we investigated the perceptions of university academics about teaching and learning of STEM. As part of a larger study, in this paper, we present a

sociology of knowledge approach ‘Legitimation Code Theory (LCT)’ to describe participant academics’ (n=15) insight of specialisation in STEM education. We aim to suggest a language by which what counts as STEM knowledge can be explicitly communicated. We use an analysis of responses to three open-ended prompts about STEM education to illustrate how LCT reveals the differences in what kind of STEM knowledge might be valued and emphasised within STEM education.

Kaur Jagdev, Manjinder

Anti-racist and decolonial practice in teacher education (Workshop)

Last summer year, my PGCE mathematics students worked in groups to create a lesson plan and resources about the historical and cross-cultural roots of mathematics, with written reflections on celebrating diversity. Lesson activities included: ‘The Game AYO’, ‘Yoruba Number System’, ‘Towers of Hanoi’, ‘Crop Circles’ and ‘Tangrams, Sudoku and Kenken’. The students reflected on the implications on their classroom teaching with pupils, in relation to unconscious bias in society and decolonisation of the national curriculum. Padlet activities will aid sharing of existing good practice, and contributions to discussion on: Historical and cross-cultural roots of mathematics, lesson plans and PGCE students, Sharing ideas from and for university colleagues and students across disciplines Sharing ideas from and for ITE colleagues and students across subjects, Classroom ideas and PowerPoints for the mathematics teaching and learning. The workshop will involve creating a padlet with contributions from BSRLM colleagues. This is intended to be a creative space for future research. As part of future research, collaborative curriculum development practice with teachers in schools is also envisaged which will involve planning and teaching topics from the National Curriculum, interviews, observations and conversations. Antiracist and decolonial ideas and learning about contributions to mathematics from people from around the world, can help pupil engagement and interest, whilst addressing diversity, inclusion, racism and social justice issues.

Lyakhova, Sofya; Durbin, Samantha

Secondary students engaging in live online enrichment programme. (Presentation)

The study reports on a series of the Royal Institution (Ri) Mathematics Masterclasses that took place in Wales and England in Spring 2021. While enrichment activities, of which Ri Masterclasses is a popular example, are usually assumed to take place in a traditional face-to-face environment, such as a university lecture theatre or school classroom, the 2021 series took place online due to Covid-19 restrictions. We investigate how the design of the online classes being different from a traditional enrichment programme (master-apprentice, collaboration, hands-on), influenced students’ engagement with mathematics. Students’ views were researched through feedback and individual interviews.

Makramalla, Mariam

Why do we learn maths: A public engagement project. (Presentation)

In this session, I want to share my experience so far, in engaging societal stakeholders of schooling (20 schooling communities) in debating the question of why we learn, and embodying the aforementioned societal debates in the form of arts. As stakeholders in the teaching and learning enterprise, parents, students and teachers have very different perceptions around problem solving and other forms of interactive learning of mathematics. I will be presenting some work-in-progress findings of the conducted arts-based activities. Findings show a generational misalignment when it comes to expectations from the teaching and learning enterprise. I hope to engage the audience in a

wider discussion around how to further engage societal stakeholders in the aforementioned debate and what our role as researchers is in view of the presented findings.

Owens, Emma; Nolan, Brien

The capacities of pre-service teachers to effectively teach mathematical problem-solving. (Presentation)

The project addresses the development of capacities for teaching problem-solving among pre-service, post-primary mathematics teachers (PSMTs). A key concern is what these capacities are, and in this project, we have adopted the framework provided by the work of Chapman (2015). This incorporates the questions of what mathematical and pedagogical knowledge and skills teachers need, and what attitudes underpin effective teaching of mathematical problem-solving. This study was conducted in an Irish university setting with three cohorts of participants undertaking concurrent initial teacher education programmes. The participants had previously received formal instruction in a university module that focussed on the 'Rubric Writing' approach to problem-solving (Mason et al, 2011). The project investigates the beliefs that the PSMTs hold regarding problem-solving, the PSMT's understanding of a mathematical problem, the PSMT's problem-solving proficiency, and the ability of the PSMTs to pose mathematical problems. We report on the mixed-methods approach we took to addressing these questions and provide an overview discussion on our findings. We will also discuss how these findings will influence our taught modules on problem-solving and problem-solving instruction.

Redmond, Ben; Golding, Jennie; Grima, Grace

'Hard to focus: difficult to learn': Covid-19 impacts on year 13 students studying mathematics A Levels in Spring 2021 (Presentation)

We explore year 13 student accounts of ways in which Covid19 has impacted their learning for mathematics A Levels, studied pre-university in England. Our findings derive from the first half of the final year of a four-year study (2017/18 to 2020/21) exploring enactment and impact of reformed mathematics A Levels, and efficacy of associated Pearson resources and assessments. Research tools were adapted to focus on impacts of Covid19. In this cohort's first year of A level study (2019/20), synchronous teaching March to July was reduced and not always sustained, and students' responses to work set were variable. Teachers had anticipated significant and wide-ranging learning gaps as students progressed to year 13. Using data collected in Autumn 2020 and Spring 2021 we analyse student accounts of how continued disruptions to teaching and learning have impacted them. Variable access to teachers, barriers to collaborative work and the challenges of remote or reduced contact working have resulted in reduced depth and breadth of learning. Additionally, many students reported negative impacts on their mathematical confidence and their wider mental health. Building on previous findings (<https://bsrlm.org.uk/wp-content/uploads/2021/02/BSRLM-CP-40-3-10.pdf>), we present a picture of students still working to overcome the challenges of the previous year while responding to continuing uncertainty as they move forward.

Richards, Fiona

Using structure in teaching mathematics, and how intuition impedes learning. (Presentation)

Although there are many connections in mathematics it is often taught as distinct topics where students learn a series of seemingly unconnected rules. This research aims to explore how mathematical structure and the connections between concepts can be used in teaching in order for students to improve their mathematical understanding. This presentation focuses on an intervention

with year 7 students being taught about decimals and fractions. I will describe how the intervention was planned using the structure of the numbers and implemented. I will then draw together the interpretation of the data from the lessons with the data from the delayed post-test and interviews with a particular focus on the difference between the immediate and the delayed results. Even though initial results indicated that students had modified their approach to decimals and were able to order them accurately, the later results showed that students displayed a persistence of errors, that might be explained by students reverting to their intuitions.

Rowlandson, Paul

Interleaving, Blocking and Exposition for Mathematical Category Learning. (Presentation).

This presentation will focus on the subject of my current doctoral thesis: the application of interleaving research in the context of category learning for high-school mathematics. The session will start with a summary of my literature review, presenting findings from previous research, discussing the theoretical mechanisms behind interleaving effects and identifying potential gaps in the current research base for interleaving. The session will then go on to describe the two studies that have been carried out so far for my thesis (one pilot study and one main study). During these experiments, high-school mathematics students attempted to learn geometric categories through either studying a blocked sequence of images, an interleaved sequence of images or watching expository videos that explain the discriminative features of each category. The findings from these studies will be shared, along with reflections from the researcher. The session will end by presenting plans for my final study, which I intend to carry out in the Autumn. This will be followed by an opportunity for attendees to ask questions or offer suggestions.

Rycroft-Smith, Lucy; Macy, Darren

Deep questions of evidence and agency: how might we find ways to resolve the tension between the teacher agency and the application of research findings in the area of professional development? (Workshop)

This is a work-in-progress session, reflecting powerful emergent tensions that has surfaced from our literature reviewing around teacher agency and the use of best practice evidence. Gorard et al (2017, p. 5) suggest a term for much contemporary practice in education might be 'evidence-resistant'. The use of research by teachers has been categorised in two ways: conceptual (as opposed to merely instrumental) research use is 'a multifaceted, multidimensional construct comprising not only direct, but also alternative forms of use, as well as non-use, misuse and abuse' (Dagenais et al., 2012, p. 287). There is a suggestion that validity and context-dependence of research evidence, and the importance of teacher professional judgement and contextual knowledge are in conflict; but more than this, that teachers may have the right to reject, translate and mutate ideas from evidence, with some provisos. Far from being a simple research to practice pipeline, Ball and Cohen (1999) propose that not only evidence, but questions form part of teacher professional learning; specifically, questions, analysis, investigation and criticism, where teachers' practice is situated at the centre of the learning and their response to stimuli emphasised. This complex view of teacher professional learning may be in tension with a rather more simple 'what works' evidence agenda. How could this tension be addressed in the context of mathematics education research and practice?

Saralar-Aras, Ipek

Teaching Spatial Geometry to Middle School Children through Technology. (Presentation).

The issue of teaching spatial geometry with technology has received a lot of attention in the last decade. Several researchers have proposed using different software packages to improve middle school children's understanding of spatial geometry. However, given the number studies on the importance of integrating such software packages into the classrooms, many maths teachers still find it challenging to teach spatial geometry with technology, particularly at the initial years of their teaching. Probably considering this, many maths programmes started to include examples on use of dynamic geometry software packages when introducing spatial geometry objectives, in addition to education authorities offering courses on various software packages. The Ministry of Turkish National Education (2018, 2021), where the researcher works, is one of these authorities which aims at improving maths teachers' techno pedagogical content knowledge (TPACK) (Koehler & Mishra, 2005), through not only giving courses on effective uses of dynamic geometry software packages but also specifying learning objectives in the middle school curricula where technology integration would be beneficial for students' learning. This paper introduces these courses and presents example uses of dynamic software packages for the specific objectives from spatial geometry (e.g., The student realizes that the formal properties of geometric solids and shapes do not change when their direction, position or size changes.

Thouless, Helen; Zerafa, Esmeralda

SEND and maths (Working Group)

The new SEND and maths Working Group is open to all and aims to promote research that looks at the intersection of SEND and maths. One of the first goals of the group is to connect researchers who have an interest in this topic. This workshop will begin with brief presentations from members of the group on their current work, followed by a discussion about why we would join such a group and what we would like to get out of it. We will end with a discussion of our philosophy of mathematics education for children with SEND.

Tiflis, Ozdemir

Ratio and Proportion: Developing a STEM-based scheme of work (Presentation)

Although the topic of ratio and proportion has received support from mathematics education research, many students still have difficulty when learning the topic of ratio and proportion in school and daily life (Johnson, 2013). The objective of this study is to determine whether a STEM-based scheme of work is an effective tool for addressing errors made by resit GCSE students in England, and students at a vocational school in Turkey. Before teaching the ratio and proportion, the pre-diagnostic test developed and was administered in both countries. Then, the pre-diagnostic test was analysed using an error analysis model, and in light of these results, lesson plans were designed. Lastly, the post-diagnostic test was administered. Data has been collected via diagnostic tests to determine the students' errors, interviews with teachers about their teaching approaches and students' errors were investigated through lesson observations. Results demonstrate that there were significant decreases in the percentages of mistakes made in 'understanding mathematical statements in questions' and in 'determining appropriate strategies to be used in problems'. These had the highest percentage among students' answers from both countries in the pre-diagnostic test. Developing an understanding of students' errors, investigating the causes of these errors, and

developing STEM-based lesson plans have provided important information about how teachers can build in support within mathematics teaching.

Wenderlich, Maya

The Milestones in the life course of distinguished mathematicians and mathematically gifted adolescents. (Presentation)

The presentation will share the results of research on milestones (significant events, critical points, and crystallizing experiments) in the course of life of outstanding mathematicians and mathematically talented adolescents. The work covers the period of approximately the last 80 years. Four distinct group of mathematicians had received their education and pursued their scientific careers at that time: - The late, distinguished professors of mathematics, - Distinguished professors of mathematics who are still alive, - PhD students and doctors of mathematical faculties, - Laureates of mathematical olympiads. The author's intention was to indicate the milestones - key events and moments in their history determined by the author (or those indicated by those interested) to reach the highest position and recognition in the field of mathematics.

Williams, Julian

Critical Mathematics Education (CME) Working Group - discussion on ~How is mathematics education critical to understanding and practice in the environmental crisis?' (Working Group)

An opportunity to discuss how researchers, educators, teachers can contribute to the sustainability agendas locally and globally. Bring along your ideas to share or just come along to learn more about how mathematics and maths education might contribute to humanity's crises and inform your practice/activism. Julian will introduce a number of ways in which maths can be critical to understanding the global crisis, which he takes to be an amalgam of the crisis of sustainability, abuses of the environment, and inequality. First, we have the problem of understanding 'modelling' which has become so prominent in the pandemic: predictions made from mathematical models are only as good as the assumptions on which they are built (which has often been not very good in the pandemic as we now know). Second, inequality and poor health systems have undermined the health systems of places for socioeconomic as well as ideological reasons: good political and social decision-making demands good data handling/statistics practices. Third, one-size-fits-all policy and practice based on generalisations (akin to attending to the average rather than distributions) have led to poor policy and practice that needed to be both global and local in its implementations. Finally, the argument for emphasising problem solving in social as well as technical contexts has been strengthened. It seems likely that these four will all become even more prominent as global climate crises mature over the coming decades.

Pete Wright (CME Working Group Coordinator) will be chairing the discussion.

Yılmaz, Ebru Büşra; Ev Çimen, Emre

Pre-service Mathematics Teachers' Experiences of Lesson Plan Preparation and Implementation in Online Education. (Presentation)

This research aims to examine the pre-service elementary mathematics teachers' experiences and opinions on preparing and implementing a lesson plan suitable for the 5E model in online education environment. The research is expected to set an example for teacher training about preparing and implementing lesson plans in mathematics teaching in online education environment. In the

research, the case study design, a qualitative research model, was used. The research group consisted of eight pre-service teachers (1 male and 7 female) from the elementary school mathematics education department at a public university in Turkey. The research data were obtained from the task forms, the peer assessment forms, the self-assessment forms, the lesson plans prepared by the pre-service teachers and video recordings of the implementation of the lesson plans. Analysis of the data was done by the content analysis method. As a result, it was found that in line with the revised suggestions offered by the researcher about the lesson plans, most of the preservice teachers brought the lesson plans to a sufficient level after revision, but they could not show the same competence while implementing the lesson plans in the online education environment. Consequently, it is recommended that in addition to the computer courses, pre-service mathematics teachers should also take online education courses and that the undergraduate mathematics curriculum be revised accordingly.