British Society for Research into Learning Mathematics

BSRLM 2025 AUTUMN DAY CONFERENCE

SESSION HANDBOOK

University of East Anglia

Saturday 8th November 2025

List of sessions

In the case of multiple contributors, * identifies the main presenter(s).
Sessions are ordered alphabetically by the primary presenter's surname.
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Research papers, workshops, and working groups

Aantjes, Max **[PRESENTATION]**

Mastery Discourse and the production of different opportunities for deepening understanding in low and high attaining class groups

Past Discourse analyses indicate that the NCETM's Teach for Mastery programme — a national mathematics teaching initiative in England — risks reinforcing the exclusion of low attaining learners. Although the programme aims to deepen mathematical understanding for all, past studies indicate the 'Big Ideas' it promotes (i.e., coherence fluency, structure, representation and variation), invoke inconsistent interpretations among teachers. Furthermore, the programme reportedly overemphasises linearity and measurability in learning, restricting struggling students to earlier elements of sequenced activities, lessons or curricula. As the programme is now extended from primary to secondary, where attainment grouping at class level is common, it seems pertinent to explore two questions: How does the TfM programme problematise mathematics teaching at secondary level; and which Discursive effects may this produce for different attainment groups? Through a Foucauldian- and Bourdieusian-inspired analysis of NCETM teaching and task guides, I argue that a certain logic emerges about how key mathematical ideas should be introduced. Crucially, this logic shapes — or at least permits — a lens through which opportunities for deepening understanding of key ideas may become treated as different in low and high attaining classes. To concretise these points, I will link the findings to excerpts from an ongoing interview study into how TfM teachers introduce theorems to different groups at KS3.

Alkorbi, Sana **[PRESENTATION]**

From blocks to thinking skills: A literature review on Minecraft and mathematical thinking in primary school

In recent years, Minecraft has become more than just a game it's made its way into classrooms around the world. This presentation takes a closer look at how teachers and educators are using Minecraft to support mathematical thinking in primary education. Based on a review of the latest research from 2009 to 2024, I explore how Minecraft is helping young learners build core thinking skills like problem-solving, pattern recognition, logical reasoning, and spatial awareness.

While the literature shows growing enthusiasm for game-based learning, especially in mathematics, it also raises important questions. For example, how exactly do teachers use Minecraft to teach math? And what kind of thinking does it really encourage? This session unpacks what the research says and doesn't say about Minecraft's role in building strong mathematical foundations.

By sharing key findings, practical insights, and open questions, this presentation invites a thoughtful conversation about how digital tools like Minecraft can make math more meaningful, interactive, and fun for young learners. Whether you're an educator, researcher, or just curious about creative ways to teach math, you'll come away with a clearer picture of where game-based learning fits into the future of primary education.

Baldry, Fay*; Harvey-Ashenhurst, Ben*; Syyeda, Farhat; Godfrey, Alison **[PRESENTATION]**

Teacher professional learning: The pivotal role of teachers' perceptions of practice in teacher learning

In this study, 13 primary teachers from 3 schools were observed teaching a mathematics lesson, and interviews with the teachers, the schools' maths lead and some pupils were undertaken. One key commonality between the schools is high levels of confidence in their capacity to develop their curriculum, with relatively high levels of internal focus for professional development and a willingness to step outside the NCETM fidelity to Teaching for Mathematics discourse. In these contexts, teachers' perceptions of practice become a more important driver in teacher learning. Triangulation of evidence has allowed us to consider relationships between teachers' perceptions of practice and classroom behaviours, and this presentation considers implications of different types of alignment between teachers' perceptions and insights made available through interrogation of classroom videos.

Boels, Lonneke **[PRESENTATION]**

Developing students' understanding of statistical graphs: A local instruction theory for primary and secondary education

Although numerous studies have examined how students interpret individual graph types, the research landscape remains fragmented; what is still missing is a coherent progression of representations supporting students' understanding of distribution. This contribution bridges theory, research, and classroom practice to explore: How can students be supported to move from case-based to distributional reasoning when working with statistical graphs. Drawing on eye-tracking research, many students are shown to interpret histograms as case-value plots, focusing on individual data points rather than aggregated distributions.

Building on these findings, this local instruction theory proposes a progression of graph types — from case-value plots and dotplots to histodots, hatplots, histograms, and boxplots — to bridge the conceptual gap between individual and aggregated representations. The sequence is grounded in a logical-historical analysis, statistics education research and principles from conceptual change theory, such as making preconceptions visible and creating cognitive conflict.

Drawing on nearly twenty years of teaching mathematics in secondary and primary education, I discuss how current schoolbooks present these graphs and how this differs from what research suggests is needed. The contribution offers insights into how teaching materials can better foster distributional thinking and statistical literacy across school levels.

Bokhove, Christian*; Ingram, Jenni*; Lee, Gabriel Chun-Yeung* **[PRESENTATION]**

Government and media responses to the PISA 2022 mathematics results

The Organisation for Economic Co-operation and Development's Programme for International Student Assessment (PISA) of 15-year-old students has arguably influenced many governments' mathematics education policies. In this presentation, we explore the relationship between the latest cycle of PISA in 2022, policymaking and the media responses in several English-speaking countries. We analysed media responses to PISA 2022 from governments, mainstream media, and social media. We focussed on a set of metrics, including the number of the responses, the sentiment of the responses, and relevant themes pertaining to PISA 2022 mathematics coverage. Our analysis shows that PISA results have been used and discussed differently by different governments and that media responses relate to pertinent policy objectives in each country. Our contribution sheds light on how the PISA 2022 results interact with policymaking for mathematics education in these countries.

Bos, Rogier **[PRESENTATION]**

AI or teacher, can you help me?

Help-seeking is a key aspect of students' mathematical problem solving. Yet, consensus on a frame or model describing what makes such episodes high-quality or assessing it have not been developed. In this presentation, we present our project to develop such a model for analysing the quality of help-seeking episodes across different sources, including teachers, peers, and digital tools such as large language models (LLMs). The model comprises nine dimensions—covering affective, communicative, and pedagogical qualities—derived from existing frameworks on AI tutoring, feedback, and mathematical proficiency. To illustrate its use, we analyse authentic help-seeking interactions between students and either a ChatGPT or a teacher while solving non-routine problems. The proposed model proved useful for identifying strengths and weaknesses in, for example, engagement, ownership, and mathematical understanding. We discuss how this approach helps to compare help from human and technological sources, and how it can support research and practice in mathematics education at a time when students increasingly seek help from AI tools.

Bretscher, Nicola*; Adler, Jill; Saunders, Piers; Ghosh, Suman **[PRESENTATION]**

Exploring university tutors' use of a mathematics teaching framework when providing lesson observation feedback in initial teacher education

We aim to explore how university tutors' use a framework for teaching mathematics when providing feedback to student teachers after observing them teach a lesson in school. A framework for teaching mathematics was introduced into university-taught sessions of our initial teacher education (ITE) programme for secondary mathematics. The purpose of introducing such a framework was to make more transparent elements of mathematics teaching which the tutor team believe, based on our understanding of mathematics education research, are central to improving the quality of student teachers' instructional practices. Tutors are required to link their feedback to non-subject specific teacher competences. As such, there was no requirement that tutors would use the mathematics teaching framework when providing feedback on lesson observations in school. However, an implicit goal is that the framework informs our various practices with student teachers throughout the programme. Indeed, some tutors did begin to use elements of the framework in their written feedback on lesson observations. Drawing on notions of situated abstraction and tool transparency, we analyse two telling cases, selected to illuminate when and how tutors use elements of the framework in providing lesson observation feedback. We discuss our initial findings and implications.

Butterfield, Stephen **[PRESENTATION]**

A research project to explore the maths curriculum access for learners with Foetal Alcohol Spectrum Disorders (FASD) at KS3 and 4

Foetal Alcohol Spectrum Disorders (FASD) is a disability caused by alcohol consumption during pregnancy. Neuroscience shows that the teratogenic effects of alcohol on the brain in utero significantly affect the parietal lobe, which is the brain's centre for numeracy and mathematical calculation. Although there has been some progress in educating children with FASD, very little research appears to have been conducted in the UK on access to the maths curriculum for pupils with FASD, especially at KS3 and KS4. FASD is not a condition recorded at birth, so the actual number of affected pupils remains unknown. Studies suggest it could impact around 3% of the school population. It is one of several complex needs and falls within the Special Educational Needs and Disabilities (SEND) spectrum.

I will outline the design of a small-scale research project that will serve as my pilot study before starting my EdD thesis. Parents of children with FASD often form support groups to share information on obtaining a diagnosis, an EHCP, and school placements. It will be through one of these groups that I plan to identify the children and where they are learning. Although the condition is neurologically based, my focus remains on teaching and learning. My research will aim to identify effective approaches used by teachers and other practitioners.

de Haan, Dédé*; Roorda, Gerrit*; De Vries, Siebrich; Drijvers, Paul **[WORKSHOP]**

Why is measuring Mathematical Knowledge for Teaching so hard? A struggle towards validation through student work analysis

Ball et al. (2008) designed a framework for Mathematical Knowledge for Teaching that distinguishes several subdomains, including Specialized Content Knowledge (SCK) as part of subject matter knowledge, and Knowledge of Content and Students (KCS) and Knowledge of Content and Teaching (KCT) as part of pedagogical content knowledge. Although several instruments have been developed to assess these subdomains, their measurements remain challenging, yet underlying validation processes are rarely documented transparently.

We developed a written test focusing on SCK, KCS, and KCT related to algebra for Dutch lower-secondary pre-service mathematics teachers (PSTs) through a two-year validation study with three iterative phases. Following an initial pilot (5 PSTs), Phase 1 involved four experts classifying items by subdomain. After revision and a second pilot (11 PSTs), Phase 2 involved experts independently scoring six PSTs' work, followed by deliberation sessions. The instrument was revised again for Phase 3, the administration to 59 PSTs and the evaluation of the results.

This workshop invites participants to evaluate authentic student work from Phase 3 and discuss their evaluations in small groups. By experiencing where disagreements emerge, participants will explore whether measurement difficulties reflect instrument limitations, overlapping constructs, or the fundamental challenge of assessing practical teaching knowledge through written responses.

Fu, Arya*; Lee, Chin Khang **[PRESENTATION]**

From classroom practice to pedagogical innovation: AI-supported mathematical modelling for sustainable futures

Mathematical modelling is considered an essential component of competence-based mathematics education, particularly in addressing socio-ecological issues and sustainable development goals (SDGs). However, due to limited modelling experience and resource constraints, many mathematics teachers face challenges in designing and implementing modelling tasks. Generative artificial intelligence (AI) provides new opportunities for supporting teachers in learning and teaching modelling in more accessible and pedagogically meaningful ways.

This exploratory classroom-based study is grounded in a semester-long teaching project that integrated AI tools into the preparation and delivery of modelling lessons on sustainability-related topics. The study focuses on three areas: (1) designing modelling tasks around sustainability themes, (2) supporting teachers' understanding of modelling processes, and (3) facilitating student – AI interactions during problem solving. Data sources include teacher – AI dialogue logs, lesson plans and teaching materials, and classroom reflections. (continued on next page)

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Preliminary analysis reveals emerging pedagogical patterns, potential challenges, and key design considerations for integrating AI into modelling pedagogy. The study aims to bridge classroom practice and methodological development, contributing practical insights and theoretical implications to ongoing discussions on mathematics education for sustainable futures.

Griffiths, Barry*; Edwards, Heather; Chen, Zhongzhou; Teixeira, Katiuscia **[PRESENTATION]**

Prompt refinement in calculus: Using generative AI to create isomorphic related rates problems

In this article we explore the possibility of integrating generative artificial intelligence (AI) technology into calculus instruction, specifically focusing on the automated creation of isomorphic related rates problems in a way that can be used in asynchronous testing for large classes. Our approach leverages large language models (LLMs) to construct diverse, pedagogically relevant problems, tailored to the demands of institutions where a common test, or a small number of test versions, is no longer feasible. By entering and reiterating the desired parameters, generative AI is used to create an arbitrary number of both generic and isomorphic questions, complete with solutions. With the more general goal being to use AI technology to aid teachers in generating problems that cater to individuals with different learning trajectories, this preliminary study demonstrates the feasibility of using LLMs to create a flexible testing scheme that offers a scalable solution to the challenge of providing large numbers of students with varied and engaging problems.

Heshmati, Holly*; Wang, Linda*; Barmby, Patrick; Zhang, Wenping* **[PRESENTATION]**

Assessing and building trainees knowledge in teaching secondary mathematics

This two-year study explores secondary mathematics trainees' knowledge of teaching across two university-led PGCE courses with two different cohorts. We adopted the Mathematical Knowledge for Teaching (MKT) framework to analyse trainees' knowledge of this broader pedagogical view through content analysis of their mind maps. In the first year of the project, we tested whether comparative judgement is a valid assessment tool, while in the second year, we shifted focus from evaluation to professional development. This meant that first-year data were analysed through judgements from 14 secondary university subject leads, whereas second-year trainees evaluated their own work. Initial findings reveal distinct patterns across three performance groups in the first year, while second-year trainees' feedback indicates the need for active pedagogy in developing their knowledge of teaching.

Hooper, Owen*; Witty, George*; Nardi, Elena; Biza, Irene **[PRESENTATION]**

"At every point I want them doing something": How an inter-community partnership helps facilitate an active learning inspired redesign of a university mathematics module

Over recent years, calls have grown for collaboration between university mathematics lecturers and researchers in university mathematics education (RUME) to address issues of research dissemination and pedagogical impact. This presentation introduces the work of an Inter-community Partnership (ICP), formed by the co-authors, to redesign a first-year mathematics module: Mathematical Skills, Sets, Numbers and Proof. For the lecturer, this redesign was an opportunity to explore alternative pedagogical approaches, guided by RUME findings, to address challenges in student mathematical communication, poor lecture participation, and limited engagement with the mathematical content. These issues are well documented within the literature on the secondary-tertiary transition. In the intervention we drew upon on active learning literature to facilitate the design of a sequence of tasks that would comprise the module. To support both the redesign and data analysis, we networked concepts from the Theory of Commognition and Communities of Practice. The presentation will explore how the ICP worked and the shifts in the lecturer's pedagogy. The intervention followed a hybrid format of chalk-and-talk and active learning, aiming to engage students more directly with the mathematics. In the presentation we explore some examples of these active learning tasks and how students, in the moment, responded to them.

Husnain, Muhammad*; Jones, Ian*; Francome, Tom; Chen, Ouhao **[PRESENTATION]**

Problem posing vs. worked examples: Exploring their effects on cognitive load and problem-solving

Problem posing involves students creating problems or questions related to a specific topic or concept, and the worked example effect relates to presenting students with a solved example before they attempt similar problems independently. Both approaches have been demonstrated to enhance learning, and in two experimental studies we directly compared their relative effectiveness for learning, and their impact on cognitive load. In both studies, the participants were Grade 6 students in Pakistan, and the questions and materials were prepared from a national curriculum book. In Study 1, we found no difference across the two groups in terms of a procedural learning measure, but the problem posing group reported a significantly higher cognitive load than the worked example group. In Study 2, we found that the worked example group significantly outperformed the problem posing group on the procedural learning measure, while reporting significantly less cognitive load. These results suggest that in certain contexts worked example followed by problem solving aids learning better than problem posing followed by problem solving.

Hyde, Rosalyn **[PRESENTATION]**

Secondary mathematics teacher recruitment: An overview of the landscape across the four nations of the UK

All four nations of the UK now have shortages of teachers of secondary mathematics. The shortages are embedded in different contexts given that education, including teacher education, in the UK is a devolved policy area. The full report, commissioned by the Joint Mathematics Council of the UK, draws on both published sources and empirical work using a survey of teachers and trainee teachers and semi-structured interviews with stakeholders. It explores the following areas: the differences and similarities between Initial Teacher Education landscape in each nation; recruitment to secondary mathematics ITE; choosing to become a teacher; financial incentives; and barriers and enablers for trainee teachers. Individual nations are found to have different characteristics and distinct approaches to ITE. The reasons behind difficulties in recruiting new trainee secondary mathematics teachers are found to be complex, and there are no straightforward solutions to the problems. It is therefore not possible to identify pros and cons for each; it is more that different contexts lead to both different and similar challenges. The report further finds that many of the reasons people do not apply for ITE for secondary mathematics teaching are related to long-standing issues with the teaching profession more widely and are common across all four nations.

Iannone, Paola **[PRESENTATION]**

University students' perception of GenAI in mathematics through the lens of the Technology Acceptance Model

Amidst the general panic caused by the availability to university mathematics students of increasingly effective generative AI, mathematics education research has perhaps neglected to investigate students' perceptions and attitudes towards the use of such tools. In this talk I present results from a study in which Finnish and UK students were asked to fill in a questionnaire related to such perceptions. The qualitative part of the dataset, consisting in the responses to open ended questions, was analysed through the lens of the Unified Theory of Acceptance and Use of Technology (UTAUT - Vankathes et al., 2003). This model comprises four dimensions: Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions and – in its original form – is used to predict the engagement or otherwise of people with (new) technology in the workplace. The thematic analysis of the open-ended questions was first carried out deductively, to find utterances related to the four categories of the UTAUT model. We then analysed utterances that could not be associated to the categories inductively. In this way we found two more dimensions: Education and Social Concerns. The UTAUT model, together with the two extra categories, helped us understanding mathematics students' perceptions of the use of generative AI in their education, in their discipline and in their future workplace, and their perceptions of the potential risks associated to this use. The picture emerging from the analysis is much more nuanced than what is thought, and in this talk I will explore some of these nuances and how they may impact student engagement with generative AI.

Ingram, Jenni*; Kimber, Elizabeth*; Lee, Gabriel Chun-Yeung*; Planas, Núria; Adler, Jill; Erath, Kirstin **[PRESENTATION]**

Capturing connections in mathematics classroom discourse

One of the challenges of observing lessons as part of research is balancing the need to capture the complexity of what is going on with the affordances for identifying themes and patterns through coding. However, coding usually reduces what is observable in the classroom into distinct and discrete boxes (or codes), losing the relationships between these and the overall sense of the coherence of the mathematical tasks and activities within a lesson. In this session, we explore an ongoing process we are developing for focusing on this sense of coherence in the analysis of lessons from a communication-responsive teaching perspective. We are particularly concerned with identifying coherence relating to how mathematical connections are intertwined with the interactional context of the lesson, which we often feel is lacking from lesson analysis, and is not captured using existing observation frameworks. We will share visual representations that we are using in an attempt to explore this sense of coherence in a way that emphasises connections that are often obscured using observation frameworks.

Ji, Yuan **[PRESENTATION]**

A multimodal semiotic approach to primary students' interpretations of early algebraic activity in linear equations with one variable

This study investigates the semiotic dimensions of primary students' early algebraic reasoning in presenting and solving linear equations with one variable. Grounded in Luis Radford's Theory of Objectification, a Teaching–Learning Activity was co-designed with a local teacher in a Chinese primary school, integrating concrete and iconic pan-balance representations. The study observed 30 students aged 9–10 through video recordings and written worksheets. Analysis revealed varied representations of variables, including numerals, Latin letters, Chinese characters, geometric shapes, and balance diagrams, with the use of traditional Heavenly Stems (天干) standing out as a culturally embedded symbolic form. Students' gestures and multimodal actions played a crucial role in developing an embodied understanding of algebraic equivalence through symmetry, recognizing that operations on one side require compensatory actions on the other. These findings support Davydov's view that algebraic thinking emerges not from symbolic manipulation but through the embodied grasp of universal quantitative relationships.

Jiang, Chang **[PRESENTATION]**

Negotiating gendered subjectivities of mathematics teachers in Chinese lesson study: A feminist poststructuralist inquiry

This feminist poststructuralist inquiry explores how gendered discourses within Chinese Lesson Study (CLS) shape female mathematics teachers' subjectivities. Within CLS's mandatory critique sessions, female mathematics teachers confront contradictory demands: proving mathematical competence in a masculinized discipline while performing appropriate feminine deference to predominantly male Teaching Research Staff, managing public criticism while displaying gratitude, and asserting pedagogical expertise while maintaining collective harmony. The study addresses three questions: What are female mathematics teachers' experiences of CLS? How do gendered discourses and power relations shape their subjectivities? What spaces for resistance exist? Using feminist poststructuralist discourse analysis, I examine how teachers position themselves within competing discourses and trace moments where they reproduce, negotiate, or resist available subject positions. Data collection involves two semi-structured interviews with 12-16 female mathematics teachers across China, supplemented by written reflections capturing immediate post-CLS experiences. This design explores both broad experiences and specific moments of negotiation, resistance, or accommodation. It contributes to understanding how collaborative teacher development may unintentionally reproduce gender inequalities, with implications for creating more equitable professional development approaches in mathematics education in China.

Jones, Ian*; Thoma, Athina* **[WORKING GROUP]**

HE mathematics education

This second in-person meeting of the Higher Education Mathematics Education Research working group will bring together researchers who work in HE mathematics education, studying issues in undergraduate learning and teaching, broadly conceived. In the first part of the session, we will focus on a brief overview of the meetings we have held over the past year, which have all been online bar the first in-person working group meeting at the Southampton BSRLM in November 2024.

In the second part of the session, we will engage in group activities to reflect on our current research related to undergraduate learning and teaching, and together we will attempt to identify emerging themes and challenges. We will draw on insights from the recent paper University Mathematics Education Research: Trends, Themes, and Opportunities by Dreyfus and colleagues (Link). This work identifies important evolutions and emerging themes in university mathematics education research, including theories and methods, teaching and learning practices (and the role of technology), and systems-level issues such as institutional structures, transitions, and matters of equity, diversity, and inclusion. Link: https://link.springer.com/article/10.1007/s40753-025-00267-5

Kimber, Elizabeth*; Ingram, Jenni*; Skelton, Jo*; Smith, Cathy* **[WORKSHOP]**

Analysing video of classroom interaction

In this workshop we will work in detail with video clips of spoken mathematics classroom interactions. We will use an approach that is widely used by researchers focusing on interactions, and which we have used as a group in occasional meetings over the last two years. The approach embraces the different perspectives people bring to the shared data, while maintaining a separation between what we observe in the data and how we interpret these observations to conjecture about the mathematical meanings afforded in that context.

Lake, Elizabeth **[PRESENTATION]**

Developing university undergraduates as mathematics role models through tutoring pupils from under-represented communities in East Anglia

This session reports on the experience of working with University of East Anglia (UEA) undergraduates who have been recruited to work directly with pupils in schools. The Year 10 tutoring initiative is just one element of a five-year project designed to support pupils across ten schools and three colleges in the East Anglia region.

The East Maths Community (EMC) project is a collaboration between UEA and the Inspiration Trust and is one of four national initiatives funded by Purposeful Ventures. It supports pupils from Year 7 to Year 13 in a range of ways, with the overarching goal of building a long-term Community of Practice and raising aspirations among disadvantaged pupils with strong academic potential.

During the session, I will describe how UEA maths and science undergraduates were prepared to work with Year 10 and Year 11 pupils who are predicted to achieve GCSE grade 7 or above and who are also eligible for Free School Meals (FSM) or a similar measure of disadvantage.

I will outline the key design principles used in:

- Developing the tutoring materials
- Preparing the undergraduates for their roles
- Providing ongoing support during the initial stages of the project

Finally, I will reflect on this part of the project's progress so far, highlighting both the lessons learned and the successes achieved.

Machino, Natheaniel **[PRESENTATION]**

Further Education student teachers' mathematical and pedagogical needs

Within the English education system, the Further Education and Training sector (FE) plays a crucial role in developing mathematical skills which are key to the prosperity and wellbeing of individuals and society. To improve society's mathematical skills, the mathematical and pedagogical knowledge of FE student teachers must be examined, and their needs should be identified and addressed. In this presentation, I report findings of the analysis of data collected through lesson observations of two FE student teachers; interviews with them and their mentors; observations of their mentor meetings; and mentor reports. To capture FE student teacher needs, the analysis drew upon the Knowledge Quartet (KQ) framework (Rowland et al., 2003), as well as thematic analysis. The findings indicate that the mathematical and pedagogical knowledge enacted by both FE student teachers during their teaching is varied and reveals critical areas of needs which are: gaps in subject knowledge; reliance on procedural explanations; adhering to a single method; unclear explanations; limited connections between examples, between procedures and between representations; limited theoretical underpinning of pedagogy; improper use of terminology (and mathematical errors); and, (over)reliance on internet resources.

Macmillan, Emily **[PRESENTATION]**

Developing student teachers' structural understanding of negative number arithmetic through the use of representations

This session reports and invites feedback on a directed numbers intervention of short duration with student teachers. Student teachers were asked to script imaginary classroom conversations before and after discussing a range of contrasting representations for negative numbers. The scripts show the variation in the critical evaluation of the representations and the connections student teachers make to the underlying mathematical structures within negative number arithmetic. The representations will be explored and delegates invited to examine their role in developing understanding of curriculum-wide structures.

Makri, Depy*; Jones, Ian* **[PRESENTATION]**

Investigating question-driven reading of mathematics

The role of questioning in reading is widely recognised as central to comprehension. We investigated the role that questions might have in directing students' "relevance appreciation" of presented sections of expository mathematical texts. We designed a study that used questions deemed as conceptual and procedural by experts, and mathematical text sections centred around definitions related to the topics of a real function's parity and periodicity. Undergraduate participants from across STEM subjects were asked which of two presented text sections would be 'more helpful' for answering a given question. We found that participants' relevance appreciation did not correspond to the experts' perceptions of questions as conceptual or procedural, but instead to the correspondence between the main focus (parity or periodicity) of the text sections and of the questions. We discuss this finding in terms of experts' judgements of conceptualness and proceduralness, and we will also consider the implications of our research for designing questions aimed to direct student reading in mathematics.

Marks, Rachel*; Gifford, Sue*; Ineson, Gwen **[WORKING GROUP]**

Early Years and Primary Mathematics Working Group: The representation of early childhood in BSRLM research: past, present and future

Reflecting the enduring purpose and values of our long-established Working Group, this session marks our 12th meeting and a significant milestone: the development of a chapter for the forthcoming book, Research in Mathematics Education in the UK: Findings from the First Forty Years of the British Society for Research into Learning Mathematics. Our chapter will spotlight research in the Early Childhood phase of mathematics education – an area rich with potential yet notably underexplored. By showcasing existing studies, we aim not only to celebrate current contributions but also to draw attention to the striking scarcity of research in this critical phase, issuing a compelling call for deeper and more sustained inquiry.

During this Working Group session, we will collaboratively shape the chapter's direction, inviting participants to contribute to two key areas of discussion:

1. How should we define Early Childhood in the context of mathematics education?
2. What themes ought to be central to research in this phase, and how well are these reflected in the existing literature?

We also warmly welcome members who are ready to commit to co-authoring the chapter – please note that timelines are tight, so enthusiasm and availability are essential! Join us in shaping a meaningful contribution to the field and advocating for the youngest learners in mathematics education.

Marks, Rachel*; Golding, Jennie **[PRESENTATION]**

Using TIMSS items to develop mathematics with meaning – but whose meaning matters?

In a small-scale classroom study exploring how released TIMSS items can be repurposed to support meaningful mathematics learning, we uncovered a notable tension between pupils' and teachers' beliefs about the purposes of mathematics learning, leading to some unexpected outcomes. While teachers aimed to promote reasoning, sense-making, and critical engagement, sample pupils frequently approached the items through procedural lenses – seeking correct answers via familiar algorithms rather than exploring underlying mathematical ideas. This tension was evident across our sample of both primary (Year 5) and secondary (Year 9) classrooms. When pupils and teachers appeared to be working towards different goals, that resulted in unexpected and sometimes counterproductive forms of engagement. Drawing on focus group and interview data, this presentation explores how these misalignments might have arisen and how pupils' belief systems appeared to influence their interactions with TIMSS items. We consider the implications for designing classroom activities that genuinely support mathematics with meaning and ask: What needs to change – at classroom, school and policy levels – to support better alignment of pupils' and teachers' epistemological stances to foster deeper mathematical engagement?

Meangru, Matthew **[PRESENTATION]**

Utilising Generative AI with undergraduate students in calculus to explore mathematical resilience

This pilot study focuses on five undergraduate students enrolled in a Calculus for Business module that incorporated Generative AI as a learning tool to explore students' mathematical resilience. According to Lee and Johnston-Wilder (2017), 'mathematical resilience allows learners to manage and protect themselves from unhelpful emotions that may arise when mathematics becomes difficult to learn.' To understand mathematical resilience in a calculus context, the five participants took part in one-hour interviews reflecting on their experiences using Generative AI during the Spring 2025 calculus class. Using Clandinin's (2022) narrative inquiry approach, I abstracted dialogue from participant interviews that focused on how students felt about calculus in relation to their engagement with Generative AI to overcome difficulties in learning calculus. Findings suggest that utilising Generative AI as a learning tool in calculus builds students' mathematical resilience.

Parkes, Sam **[PRESENTATION]**

Beyond a checklist? A multiple case study exploration of the evaluation of primary mathematics teaching

This presentation summarises research into the evaluation of primary mathematics teaching, interrogating practices that extend beyond procedural checklists to encompass the interrelated domains of professional knowledge, professional development, and teacher identity. Adopting a multiple case study design within the context of a multi-academy trust, the research examines the perceptions and experiences of senior leaders, subject leaders, and classroom teachers. Findings reveal persistent tensions concerning evaluators' subject knowledge, the authority and legitimacy of feedback, and the divergent constructions of what constitutes "effective" mathematics teaching. The ascendancy of a mastery approach further complicates evaluative practices, raising questions about conformity, autonomy, and the negotiation of professional agency. The study highlights the potential of enquiry-based, dialogic models of evaluation to foster reciprocal learning between observers and teachers, while also acknowledging limitations relating to context, positionality, and generalisability. The paper concludes by identifying implications for the design of evaluation frameworks that prioritise professional growth, advocate for greater staff ownership of evaluative criteria, and suggest directions for further research into leadership perspectives and the broader impact of evaluative practices on teacher professionalism.

Pepona, Eleni **[PRESENTATION]**

Improving mathematics literacy in a Further Statistics classroom

Disciplinary literacy has long been regarded as an area for further development in the education sector in the UK. Mathematics literacy is no exception. Statistics and probability have a distinct literacy that students often find challenging to get to grips with. The type and level of rigorousness of language that is required in written communication is a hybrid of mathematical notation and natural language narrative. As such, students transitioning into A-level study of these topics often struggle to both appreciate the need for and adapt their communication style accordingly.

In this action research project, I looked to further develop the curriculum material used in the Statistics A-level Mathematics course, specifically, the chapters relating to the introduction to probability with a view to improving written literacy output within the topic by conscious literacy instruction through a first-year undergraduate probability textbook. I worked with my Lower Sixth Further Mathematics class of 12 students. An analysis and comparison of the class's end of year assessment results versus a baseline assessment task showed definite development in their literacy in this topic.

Pescetelli, Rita **[WORKSHOP]**

From Research to Reality: Bridging the 'So What' for ADHD-related characteristics in Mainstream Maths Classrooms

Addressing the critical social justice and policy imperatives for students with ADHD-related characteristics, this workshop translates research in an alternative provision setting into practical action for mainstream secondary mathematics classrooms, with a particular focus on enhancing access to GCSE word problems. Empirical findings from an exploratory study through clinical interviews uncovered two key, subtle mathematical barriers for such students: first, challenges related to language and reasoning, such as lexical ambiguity and distinguishing explicit from implicit language; and second, difficulties stemming from characteristic executive function, specifically challenges with inhibitory control and the resulting over-reliance on visible numerical values. The workshop's central theme is bridging the gap between research rationale (the 'why') and realistic application (the 'how'). Participants will engage in a collaborative critique of three practical mainstream scenarios and their corresponding literature-informed actions to determine the feasibility and scalability of target low-effort/high-impact strategies, ensuring they benefit the whole class without further disadvantaging any student. This workshop connects research to practical reality and is relevant to both continuing and initial teacher education.

Proulx, Jerome **[PRESENTATION]**

Giving meaning and comparing %: the case of the Mary & John task

This Research Report (RR) presents preliminary findings on a study about students' ways of making sense of % through their engagements with tasks. Grade-8 students' strategies for solving one comparison task is looked into, a modified version of Hart's (1981) Mary & John task, as a way to investigate the meaning students give to the role of the referent-unit of %. Using the statistic vs. function uses of %, these preliminary findings insist on the rich variety of meanings and justifications students offer when comparing %, and how this variety depicts an enlarged view of what is to be considered adequate or not when comparing % situations.

Rotem, Sigal*; Coles, Alf* **[PRESENTATION]**

Grounding prospective mathematics teacher noticing in socio-ecological issues: learning to notice in turbulent times

Addressing the gap between current turbulent times and the seeming 'objectivity' of mathematics, we explore what constitutes prospective teachers (PTs) of mathematics learning to notice, the links they make to socio-ecological issues of relevance to their lives, and the role of the mathematics teacher educator (TE). We perceive teacher noticing as attending to and interpreting students' mathematical thinking with emphasis attention to details for in-depth interpretation. We introduce the notion of "authenticity": the extent to which teachers' task design choices include relevant socio-ecological themes.

The study's context is a problem-solving course in teacher preparation program, conducted during wartime, heightening turbulence and data significance. Participants photographed and discussed socio-ecological concerns (photovoice method), designed mathematical tasks, and taught and reflected on what they noticed. We focus on Nadin (Bedouin community member) as an illustrative case, examining shifts in the accounts of what she noticed, the socio-ecological issues she addressed and the TE's role. Findings revel that the socio-ecological issue Nadin brought to her classroom, surface deeply held beliefs and engaged her students with their beliefs. Her accounts are characterized by subtle shifting between detail and interpretation. We also uncover the way storytelling space offered by the TE can support PTs' noticing in connecting mathematics to relevant socio-ecological issues.

Schüler-Meyer, Alexander **[PRESENTATION]**

Re-designing pre-service teacher education for practice – insights from a Dutch teacher education program

Despite many approaches to bridge the theory-practice divide in Dutch teacher education, universities still do not sufficiently prepare beginning teachers for dealing with the multilayered demands of classroom teaching, leading to dissatisfaction and dropout from the teaching profession. This presentation gives insights into a two-year design-research project to innovate the mathematics education coursework at a Dutch university, through establishing a dual focus on 1. reinventing theoretical knowledge from coursework and on 2. experimenting with student-centered teaching practices in class. It will be shown how beginning teachers start to adopt ambitious, student centered teaching practices, while at the same time navigating the complex expectations between school teaching and university coursework towards their teaching.

Syyeda, Farhat*; Baldry, Fay*; Harvey-Ashenhurst, Ben* **[PRESENTATION]**

What can you buy in 50p? Exploring mathematics with primary school children and their families, one p at a time

This presentation forms part of an Action Research project conducted in the East Midlands region of England, involving women from low-income and under-served communities. The research aimed to explore the challenges women face in returning to education, and to support their engagement in adult learning through carefully crafted interventions (interactive mathematics workshops). Whilst in the wider study, we collected data through two sets of focus group interviews with 34 participants, here we focus on workshop activities only.

Collaborating with a local adult education college and two primary schools, we organised four workshops inviting children and their families to participate in playful mathematics learning using everyday objects such as coins, dry pasta, stationery items etc. The workshops were designed to present mathematics as fun, accessible, and inclusive, with the goal of breaking down barriers to education and promoting awareness of intergenerational and lifelong learning. In this presentation, we will share our experiences of delivering these workshops, detailing the content and methods used, and offering a critical evaluation of the outcomes achieved.

Thouless, Helen*; Hilton, Caroline* **[WORKING GROUP]**

'SEND and Maths' Working Group: The representation of research relating to special educational needs and disabilities at BSRLM conferences: Past and future directions?

We have been working on identifying past articles in the BSRLM proceedings that focus on issues surrounding mathematics and Special Educational Needs and Disabilities (SEND). This is so that we can write a chapter about how SEND has been represented by BSRLM members. This chapter will form part of a book exploring the different research foci of BSRLM over the last 40 years. In this session we will discuss the purpose of this chapter and the story that we want to tell. During the discussion we will also reflect on whether we have the right inclusion criteria and what themes we should explore.

The process of identifying these articles has indicated to us the need to raise the profile of children with SEND in mathematics classrooms. With this in mind, we would like to use the workshop time to analyse the gaps in the research and to discuss how we could use this working group to address these gaps.

Thouless, Helen*; McCarthy, Sarah*; Gifford, Sue*; Ockleford, Adam **[PRESENTATION]**

See! Hear! Exploring pattern making in maths and music in children with neurodevelopmental differences

Pattern recognition is a vital skill for both music and mathematics. Building on our work in early patterning (Borthwick, Gifford and Thouless, 2021), we explored possible parallels in the development of children's recognition of mathematical and musical patterns (Ockleford, 2015). We worked with a small sample of primary school children with neurodevelopmental differences. We introduced the children to a pattern either made with objects or with musical sounds, or both. They were then challenged to copy or extend the pattern, or to translate from one mode to another. These patterns increased in complexity as explored in Ockleford et al. (2025). We found that there were similarities between the progressions in pattern recognition in the two modes. Results also showed that patterns using both objects and musical sounds were more easily understood than patterns focused on one domain. However, there were distinct differences in responses to the modes from individual children.

Van den Eynde, Sofie*; Kavatsyuk, Oksana **[WORKSHOP]**

Inclusive STEM Education: Check your course with us!

Fostering diversity in STEM fields is essential to meet the growing demand for skilled professionals. But how can we ensure that our teaching practices welcome and support all students?

In this interactive workshop, we introduce an evidence-based checklist with practical, easy-to-implement tips and recommendations to make your course more inclusive. You will have the opportunity to assess your own course, identify areas for improvement, and exchange ideas with colleagues.

We will also look at how active-learning approaches can both foster inclusion and unintentionally create barriers, and discuss ways to make these methods supportive for all students.

Join us to reflect, exchange experiences, and walk away with concrete actions to make your STEM classroom more inclusive and diversity-friendly.

Vohra, Zain Ul Abideen **[PRESENTATION]**

Evaluating the effectiveness of the Linguistic and Cognitive strands of the Oracy Framework as an assessment tool

In this study I aim to evaluate the effectiveness of the linguistic and cognitive strands of the Oracy Framework as an assessment tool, involving four Year 12 GCSE Resit students as they solve two Mathematics problems in pairs. Teacher intervention was restricted to prompting where appropriate. The students were given a maximum time limit of five minutes for each task. These paired activities were audiotaped, transcribed and analysed in relation to the Oracy Framework with conclusions drawn on the wider implications for professional development as part of action research.

Voutsina, Charis*; George, Lois; Flack, Stephanie* **[PRESENTATION]**

Early number conversations at home: Insights from the 'Numbers in Everyday Life' project

We will present findings from the implementation of the 'Numbers in Everyday Life' programme, carried out with families of children aged 3–5 years in the UK and Jamaica. The programme is designed to support families in identifying and making use of everyday opportunities to engage in conversations about written numbers found in their environment. Drawing on a preliminary qualitative thematic analysis of 338 visual and textual posts uploaded by participating families to an online platform, we will explore four key themes that highlight opportunities for learning. We will incorporate insights from interviews with Early Years practitioners to examine how the programme can strengthen connections between home and Early Years settings/classrooms in supporting children's understanding of numerals and their meanings in everyday contexts.

Wright, Pete*; Angier, Corinne*; Goodland, Jane*; Hilton, Caroline*; Inan, Gamze*; Ineson, Gwen; Kaur, Balbir **[WORKING GROUP]**

Critical mathematics education (CME) working group: Promoting socially just mathematics teaching (PSJMT)

The PSJMT research project, with 15 team members drawn from the Teaching Maths for Social Justice Network (www.mathsocialjustice.org), explored how mathematics teacher educators can promote socially-just pedagogies and practices amongst student teachers and experienced practitioners they work with. At the previous BSRLM conference we focused on the professional development workshops which we developed through the project (freely available on the TMSJN website). In this session we will focus on the themes that emerged from the reflections of teacher educators' experiences during research team meetings. We will briefly present the project and relevant findings, then use these to prompt a discussion around the implications for practice.

The CME Working Group (launched in November 2015) is open to all and aims to promote research that brings about positive social change through mathematics education. CME aims to identify and challenge ways in which mathematics is commonly used to maintain the status quo and reproduce inequities in society. It proposes an alternative and empowering conceptualisation of mathematics, which enables people to better understand their social, political and economic situations, and to advocate and bring about changes leading to a more just and equitable society.

Xue, Jingye **[PRESENTATION]**

Mentor and novice mathematics teacher's learning in professional development settings

This study focuses on the phenomena of learning and identity during mentoring meetings between early career teachers (ECTs) in secondary mathematics and their mentors in England, treating the mentor-mentee pair as one unit of analysis. My philosophical perspective draws on socio-cultural theory and participatory learning concepts. Based on this philosophical stance, I draw on commognition theory and identity as narrative from Anna Sfard, combined with the concept of ritualization from Catherine Bell to conceptualise teachers' mentoring meetings. My methodology draws on conversation analysis.

I am collecting data through video recordings of mentoring meetings and a short interview with mentor and mentee at the end of the school term. This study aims to explore changes in learning and identity in ECTs' mentoring meetings. In this seminar, I will set out the theoretical background and offer a pilot analysis of one meeting.

Zhang, Wenping*; Wang, Linda*; Barmby, Patrick **[PRESENTATION]**

Assessing maths lesson planning among Chinese pre-service teachers through comparative judgment

Recognised as a fundamental teaching competence, lesson planning quality is crucial for preservice teachers. This study aimed to develop and explore a robust method for assessing the lesson plans of 33 Chinese preservice secondary mathematics teachers (PSMTs), using the Mathematical Knowledge for Teaching (MKT) framework. Participants submitted a mind map of lesson planning in general, and a written lesson plan on the topic of algebraic expressions, which were evaluated by 11 expert teachers using a Comparative Judgement (CJ) approach, supplemented by feedback collected via a questionnaire. Preliminary findings indicate a key imbalance: PSMTs demonstrated greater strength in Subject Matter Knowledge (SMK) compared to their Pedagogical Content Knowledge (PCK). The top-performing lesson plans, however, showed distinct evidence of more sophisticated pedagogical reasoning, particularly in the Knowledge of Content and Curriculum (KCC) subdomain. The study's results provide actionable suggestions from expert teachers for PSMTs' future development.