



British Society for  
Research into  
Learning Mathematics

**BSRLM SPRING DAY CONFERENCE  
(ONLINE) 2026**

**SESSION HANDBOOK**

**Saturday 7<sup>th</sup> March 2026**

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In the case of multiple contributors, \* identifies the main presenter(s).  
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## Plenary Presentation

**Professor Hilary Povey**

***What are the ‘orderings’ of mathematics education research? How might we need to contain/constrain them in arguing for a mathematics education for solidarity and hope?***



Hilary Povey is Professor Emerita, Sheffield Hallam University. Her research centres on social justice issues in mathematics education currently focusing on mathematics education for solidarity and hope. She has been an active member of the BSRLM since 1989, Treasurer and Chair of the Society and an advisory editor of RME since its inception. She has led a number of curriculum projects related to school mathematics, most recently *Mathematics in the Making* and the *Project in Citizenship and Mathematics*.

### **Abstract:**

In the plenary, I will be concerned to problematise how (mathematics) education research is ‘ordered’ – what taken-for-granted and mostly unnoticed assumptions underpin our practices, the language we use, the artefacts we employ, the textual conventions we require and are required to adopt and how the products of research are and should be valued – what ‘counts’. I also will discuss why this matters - why we should all be concerned to work for a mathematics education for solidarity and hope whatever what our field. And I will make some tentative suggestions about how our practices might change.

## Research papers, workshops, and working groups

[Where there are multiple authors, a \* is used to identify presenters]

**Alqahtani, Ghadah**

**[PRESENTATION]**

***Saudi female high school mathematics teachers' beliefs and instructional practices about mathematical problem solving: A comparison between novice and experienced teachers***

The purpose of this study is to explore the beliefs and instructional practices related to mathematical problem solving (MPS) among novice and experienced Saudi female high school mathematics teachers. The research addresses three main inquiries: the key beliefs of the teachers about MPS, the relationship between their beliefs and classroom practices, and the similarities and differences in beliefs and practices between novice and experienced teachers. This qualitative research follows a naturalistic approach employing case study methodology and thematic data analysis. Six teachers, three novice and three experienced, were purposively selected from four schools in Riyadh City. Data were collected through interviews (pre-observation and post-observation) and classroom observations. The findings suggest that both novice and experienced teachers hold neutral to negative beliefs about learning and teaching MPS such as being time consuming and beyond students' abilities. It was also found that their beliefs about MPS were shaped by their early schooling experiences. Despite acknowledging MPS's importance for students' cognitive development and real-world application, participants admitted prioritising solving routine problems over MPS in their daily teaching due to time constraints required to cover other curriculum content. Interestingly, significant differences emerged between the novice and experienced teachers in their beliefs about the nature of mathematical problem and MPS. While novices perceive them from a morphological point of view, focusing on the form and structure, experienced teachers tend to stress on the situation and students' engagement in the solution process. The findings also reveal that the relationship between teachers' beliefs and teaching practices is complex. However, the teachers' MPS-related teaching practices generally aligned with their beliefs in terms of favouring routine over non-routine problem-solving tasks, and their teaching practices often mirrored how they were themselves taught when they were in school and college. Based on the results, this study emphasises the need to break the cycle of 'teaching as they were taught' by activating MPS learning and teaching from the earliest stages of education. Moreover, pre-service and professional development programs should equip teachers with the theoretical knowledge and practical skills to effectively teach MPS.

Archer, Rosa\*

[PRESENTATION]

***Learning across phases: A collaborative approach to teaching fractions in initial teacher education***

In this paper we report on an event where two cohorts of Pre-service teachers, training to teach pupils aged 11-18 (Secondary phase) and pupils aged 5-11 (Primary phase), respectively, engaged in a collaborative pedagogical discussion and planning of a fractions lesson. The rationale was to develop Secondary Pre-service teachers by allowing them to gain a better understanding of how Primary school children learn and by being exposed to the use of manipulatives and practical activities. Primary Pre-service teachers would develop their subject knowledge and confidence by working with mathematics specialists. The Primary Pre-service teachers are given the role of the expert in the effective use of practical activities, while the Secondary Pre-service teachers' expertise lies in mathematics. Data were gathered through an online questionnaire completed by participants after the event. Our data suggests that the main gains happened by observing and reflecting on the trajectory of children's mathematical development, and both cohorts commented positively on the value of working collaboratively.

Asal, Aslemand\*; Saldagna, Louisianne; Gangaram, Selena

[PRESENTATION]

***Positive attitudes, greater achievement: The role of a scaffolded collaborative project in an introductory statistics course***

Students often enter introductory statistics courses with fear, largely due to a lack of confidence in their mathematical abilities. This fear can make it challenging for educators to effectively engage students in learning statistics. This study aimed to examine undergraduate students' attitudes towards statistics by the end of an introductory statistics course designed for non-statistics majors (e.g., psychology, biology, neuroscience) and to assess how a semester-long scaffolded collaborative project contributed to their statistical learning. Throughout the course project, students developed their own research questions, collected and analyzed data using R, and presented their findings both orally and in writing. A mixed methods approach was used to survey students' attitudes toward statistics at the end of the course. Quantitative analysis indicated that students who felt more positive about statistics were more interested, invested more effort, and valued the subject more highly. Additionally, their increased positive feelings correlated with higher statistics achievement, accounting for their self-perceived mathematical abilities. Thematic analysis of qualitative data revealed that students believed the group project improved their statistical literacy, made learning statistics more engaging and meaningful, and facilitated the application of their knowledge to other academic areas.

Awortwe, Peter Kwamina

[PRESENTATION]

***Designing for invariance: A tool-fading geometric construction task supporting conceptual reasoning for beginning teachers***

This paper presents an innovative tool-fading exploratory geometric construction task designed for beginning teachers in a dynamic geometry environment. The task engages participants in constructing and exploring an angle bisector through a carefully sequenced dynamic construction, followed by open-ended investigation using systematic dragging and guided reflection. Drawing on established pedagogical principles, including scaffolding, collaborative learning, reflective practice, instrumental orchestration, and dynamic manipulation, the task supports learning progression, productive mathematical talk, dialogic engagement, and the development of beginning teachers' technological, pedagogical, and content knowledge (TPACK). Beyond these operational principles, the task is underpinned by higher-level epistemic principles: invariance under dragging, guided didacticity, semi-structured openness, structural generativity, and intentional tool fading. The deliberate transition from tool-supported construction to reconstructing the angle bisector using a straightedge (markable ruler) foregrounds the shift from instrumental action to conceptual geometric reasoning. Rather than presenting the angle bisector as a predefined object or procedure, the task positions it as an emergent invariant, discovered and justified through interaction with the dynamic construction. The task was implemented with beginning teachers working in pairs, with data collected via screen recordings, audio dialogue, and reflective responses. Analysis indicates that the task supported invariance reasoning, dialogic engagement, and awareness of the mathematical affordances and constraints of digital tools, while also enabling the generation of multiple geometric structures from a single construction. This study argues that intentional tool reduction can offer a powerful design principle for bridging exploratory activity, deductive reasoning, and professional learning in teacher education. Implications for designing technology-integrated geometric construction tasks that foreground conceptual understanding and meaningful mathematical reasoning are discussed.

**Biza, Irene\*; Rowland, Tim\***

**[PRESENTATION]**

***Revisiting mathematical problem solving: Analysis of undergraduate mathematics students' approaches to a problem***

This session is inspired by the “flowerbed problem” discussed in Rowland’s (2009) reflection on his own problem-solving approach. In that account, Rowland described how systematic exploration of specific cases led to the identification of patterns, the formulation of conjectures, and ultimately the development of a general rule that generated all valid solutions. A similar problem was used with final-year undergraduate mathematics students enrolled in a mathematics education module led by Biza. Students were asked to solve the problem and reflect on their problem-solving processes using research narratives in mathematics education as part of a summative assessment (Portfolio of Learning Outcomes). In this session, we will first introduce the “flowerbed problem” and illustrate different solution approaches, both inductive and deductive, including testing specific cases, constructing conjectures, and algebraic modelling. We will then describe the module, its assessment and the students before presenting responses of three students. We will share initial observations from our analysis, focusing on students’ use (or non-use) of exploratory routines, the coherence of their mathematical arguments, the balance (or lack) of inductive and deductive reasoning and the potential role of digital resources.

**Boghina, Serban\*; Duah, Francis\*; Tasic, Boza**

**[PRESENTATION]**

***Worked examples in open and commercial textbooks: Differences in learning opportunities***

This study compares worked examples in open educational resource (OER) and commercial calculus textbooks, examining the learning opportunities they afford through cognitive demand, representations, type of response expected, and methods of solution validation. Examples from both resource types were systematically coded using a structured analytic framework. A chi-square test of independence (SPSS) was conducted to examine association between textbook type and level of cognitive demand. A similar test was conducted to examine associations between textbook type and representations, type of response expected, and methods of solution validation. Results reveal statistically significant differences in the distribution of cognitive demand in the two types of textbooks. OER textbooks were more likely to include examples classified at higher levels of cognitive demand, while commercial textbooks more frequently presented procedurally oriented tasks. Differences were also observed in representational diversity and the explicit validation of solutions. (continued on next page) Limitations of the study are discussed. Nonetheless the findings contribute to ongoing debates about the pedagogical quality of open versus commercial textbooks. Beyond considerations of cost and access, textbook choice appears to shape the forms of mathematical engagement made available to students. Implications for curriculum design and instructional decision-making are discussed.

**Bokhove, Christian\***; Rycroft-Smith, Lucy\*

[WORKSHOP]

***Exploring strategies in Countdown: What can we learn from 30,000 number rounds?***

Countdown is a well-known game show that has been around since 1982. The game show includes number rounds where contestants need to obtain a target number by using four operations (addition, subtraction, multiplication, division) on six numbers. Using publicly available data from thousands of number rounds in Countdown episodes, we explore the computations contestants used with regard to strategy choice and strategy complexity. In this workshop, we will first present our initial findings from our exploratory analysis, including a taxonomy of major strategies and associated measure of complexity. After that we present workshop participants with some example Countdown number rounds and ask them to reflect on the effectiveness of different strategies.

**Cobo, David\***; Duah, Francis\*; Tasic, Bozaa

[PRESENTATION]

***Evaluating supplemental instruction using simulated data: A propensity score study***

The use of propensity score analysis (PSA) for evaluating Supplemental Instruction (SI) as an educational intervention in undergraduate mathematics is widely underutilized. In general, the evaluation of SI presents a challenge as students self-select into participation, resulting in inherent differences between participants and non-participants. This is also known as self-selection bias. As a result, methodologies that compare differences in mean grades may yield biased estimates of program effectiveness. Propensity scores serve as a balancing score that reduces selection bias by creating comparable treatment and control groups based on observed covariates. Multiple matching techniques are evaluated, including nearest neighbor, optimal pair matching, and full matching, with balance assessments. This study was conducted using simulated data derived from real data from a first-year calculus course. The study compared PSA-based estimates of SI effectiveness with results from multiple linear regression and unadjusted two-sample t-tests. Using the simulated data, PSA was assessed on distinct and realistic sample size configurations to evaluate the impact of sample size on the robustness of PSA. These findings demonstrate that matching methods may substantially improve covariate balance and produce treatment effect estimates that statistically differ from direct comparisons. This highlights the importance of design-based approaches in observational studies. We hope that these findings showcase the usefulness of propensity score methods to mathematics education researchers seeking to draw causal conclusions when randomized experiments are not feasible.

**Dowker, Ann\*; Mark, Winifred****[PRESENTATION]*****Mathematics anxiety, attitudes and performance in Hong Kong primary school children***

This study investigated attitudes to mathematics and their relationship to performance in a Chinese sample, and looked at grade and school effects. Participants were Hong Kong children in a Chinese-medium school (22 first- graders, 25 third-graders) and an English-medium school (27 first-graders, 16 third-graders). They underwent the Mathematics Attitude and Anxiety Questionnaire (Thomas and Dowker, 2000) and the British Abilities Scales Basic Number Skills (BNS) test. The attitude questionnaire contains four scales: Self-rating, Liking for maths, Anxiety and Unhappiness at failure. Third-graders scored higher than first-graders on BNS ( $F(1, 86) = 76.19$ ;  $p < 0.001$ ;  $\eta p^2 = 0.47$ ). They showed more Unhappiness at Failure ( $F(1, 86) = 5.16$ ;  $p = 0.025$ ;  $\eta p^2 = 0.057$ ) but no other attitude differences. Chinese-medium school pupils scored higher than English-medium school pupils on BNS ( $F(1, 86) = 6.21$ ;  $p = 0.015$ ;  $\eta p^2 = 0.067$ ). They showed more Anxiety ( $F(1, 86) = 6.21$ ;  $p = 0.015$ ;  $\eta p^2 = 0.057$ ); lower Self-rating ( $F(1, 86) = 8.33$ ;  $p = 0.005$ ;  $\eta p^2 = 0.088$ ); but greater Liking for maths ( $F(1, 86) = 23.6$ ;  $p < 0.001$ ;  $\eta p^2 = 0.215$ ). There were no School/ Grade interactions. All attitude variables correlated with one another, but none with BNS. Thus, as expected, older children performed better. Children in the Chinese-medium school performed better; were more anxious but liked maths more. Unlike in some UK studies, attitudes were not related to performance.

**Duah, Francis****[PRESENTATION]*****Do explicit learning outcomes help or hinder? Evidence from a small-scale experimental study in calculus.***

Sharing learning outcomes prior to instruction is commonly justified through constructive alignment and theories of self-regulated learning. Constructive alignment proposes that clearly articulated outcomes align teaching and assessment, while self-regulation research suggests that explicit goals support planning and monitoring. However, experimental evidence of their impact in undergraduate mathematics remains limited. This study reports a small-scale randomised experiment examining whether learning outcome prompts influence achievement on a calculus topic (sequences). Twenty-two participants were randomly assigned to a treatment group ( $n = 12$ ), who received notes with learning outcome prompts and were instructed to use them to guide their reading, or to a control group ( $n = 10$ ), who received identical notes without outcomes and were instructed to read for understanding. Participants completed a 12-item quiz and a brief background survey. An independent-samples t-test showed that the treatment group ( $M = 9.33$ ,  $SD = 3.42$ ) scored lower than the control group ( $M = 11.60$ ,  $SD = 4.55$ ), though the difference was not statistically significant,  $t(20) = -1.34$ ,  $p = .19$ . The effect size was moderate ( $d = -0.57$ ). Given the small sample, the study was likely underpowered. Follow-up interviews with six students suggested that learning outcomes functioned as navigational tools. The findings complicate assumptions about outcome-sharing and raise questions about how students interpret and enact stated goals in university mathematics.

Fu, Arya

[PRESENTATION]

***Sustainability in mathematical modelling competitions: An analysis of competition tasks***

This exploratory study examines how sustainability-related issues are constructed and represented within mathematical modelling competitions. In recent years, research in mathematics education has increasingly engaged with Education for Sustainable Development (ESD). However, much of this work has focused on classroom practice and teacher competence, with less attention given to how sustainability is reflected in the design of mathematical modelling tasks at the level of competitions. The study draws on task statements from modelling competitions situated in different institutional settings, including international mathematical modelling competitions and regional modelling activities. By comparing tasks across these contexts, the research seeks to explore how sustainability issues are presented. A qualitative text analysis approach is adopted, focusing on two interrelated dimensions: the sustainability domains represented and how these issues are mathematically framed. The study further considers what kinds of “sustainable futures” are implicitly imagined through task design, aiming to offer an initial perspective on the role of modelling competitions in shaping students’ understandings of sustainable futures.

Gautham, Nayanatara Ruth\*; Nimkar, Jioo\*

[PRESENTATION]

***Understanding Anupad: Preliminary findings from the analysis of a mathematics assessment tool in India***

Accurate diagnosis of students’ mathematical understanding is essential for providing timely and appropriate instructional support. In the Indian context, many students perform below grade-level expectations, often due to gaps in instruction in earlier years. Reliable diagnostic assessment is therefore critical. This study examines Anupad, a diagnostic assessment tool for mathematics and language developed by Quality Education Support Trust (QUEST) in India, designed to identify the grade level at which a student’s understanding currently lies. Anupad comprises two components, literacy and numeracy; the present paper focuses on the numeracy assessment. The numeracy assessment consists of 64 items, each scored for one or two marks. The mathematics component, currently available in Marathi, the medium of instruction in government schools in Maharashtra, has been administered to 2,698 students across the state. By identifying students’ current grade-level attainment, the tool seeks to enable more targeted instructional planning and to support the implementation of level-based learning aligned with students’ present understanding. This study presents early evidence contributing to the validation of Anupad. In particular, it reports findings from exploratory factor analysis conducted to examine the underlying structure of the numeracy assessment and to identify latent constructs represented by the items.

Hataru, Vesife

[WORKSHOP]

*Post-publication discussions in mathematics education research*

In a short communication published in *For the Learning of Mathematics (FLM)*, Aguilar (2020) raises concerns about the limited presence of intentional post-publication discussions (PPDs) in mathematics education research. The communication offers thoughtful ideas about why such discussions matter and how they might contribute to the field. Building on these ideas, this session is designed as a discussion-based format rather than a formal presentation. Participants will be invited to reflect on their own experiences with post-publication engagement, to respond to the issues raised by Aguilar, and to collectively explore possibilities for fostering more post-publication engagement in mathematics education research.

Huang, Liying

[PRESENTATION]

*Integrating multi-duo artefacts to develop spatial skills and geometrical reasoning*

Geometrical reasoning and spatial skills are essential for students' success in geometry and for their future lives. This study, as part of a broader PhD research project, aims to examine how students develop these competencies through the use of multi-duo artefacts. The study adopts a design-based approach involving three phases of classroom observation. Participants were students in grades 7 to 10 from three schools in China. This paper presents findings on how combining any two of three artefacts, namely tangible objects, virtual reality, and GeoGebra 3D, into what we call multi-duo artefacts creates a highly integrated learning environment. In this setting, perception, embodied action, formalisation, and verification work together in a dynamic cycle, closely linking learners' spatial skills and geometrical reasoning. The results show that geometrical reasoning supports spatial skills, such as visualisation, understanding relationships, and orientation, by helping learners externalise their skills. In turn, spatial skills provide epistemic feedback that enriches geometrical understanding. Overall, these findings suggest that this integrated learning environment catalyses students' development of a deep geometrical understanding.

Ingram, Jenni\*; Erath, Kirstin\*

[PRESENTATION]

***Balancing complexity and usefulness in developing and working with a teaching framework***

There is a plethora of frameworks addressing various aspects of teaching, both for the purposes of analysing and developing teaching. In our work with teachers across seven countries in three continents, we frequently found that teachers' descriptions of their practices did not neatly fit into single frameworks but rather connected and combined different aspects of multiple frameworks in varied productive ways. Consequently, we worked on developing a framework that attempted to capture this variety and the relationship between different frameworks within our focus on language and communication in mathematics classrooms. Teachers found this framework familiar and reported resonances with how they thought about their practices, but not useful in developing or analysing their practice. In the session, we reflect on what we learnt about the need to balance this complexity with the usefulness of targeting particular aspects for teacher development.

Macmillan, Emily

[PRESENTATION]

***Seeing, saying, and reasoning: Observing mathematics teachers' spatial thinking***

Spatial reasoning, the ability to visualise, manipulate, interpret and solve problems using images, is not only key for success in mathematics and other STEM subjects, but also essential for everyday life. Spatial reasoning has been shown to be teachable, and improved spatial reasoning skills have been linked to improved performance in mathematics. Yet little research has been conducted into teachers' spatial reasoning. We investigated the types of spatial reasoning mathematics teachers used when describing a dynamic image, and how their reasoning developed when discussing their visualisations with a colleague. We report on the preliminary findings of this study which aims to develop a tool for observing spatial reasoning.

**Makramalla, Mariam**

**[PRESENTATION]**

***Who owns the mathematics classroom: A community based assessment of power dynamics and influence***

Drawing on existing struggles with administering student centred instruction to overcrowded classrooms, in this session I problematise the question of classroom ownership. I build my argument on the theoretical foundation of the assets based community development framework; a framework that has been utilised in the development sector. The intention is to present preliminary findings of an ongoing study that challenges the existing power structure as it questions the degree of community ownership of a mathematics classroom. A classroom is a community of learners which is in turn embedded in a wider community of practioners. The experience of the inner classroom community circle has a direct impact on the manifestation of questions of citizenship in the outer community. In this ongoing study I seek solutions to the problem of overcrowded classrooms by mapping out connections between the aforementioned inner and outer community. The study is still ongoing and I hope to use the conference space to discuss further some of the preliminary findings.

**Marks, Rachel\*; Gifford, Sue\*; Ineson, Gwen\***

**[WORKING GROUP]**

***Early Years and Primary Mathematics Working Group***

The Early Years and Primary Mathematics Working Group meets regularly at the BSRLM Day Conferences and this will be the 13th meeting of the group. During this meeting, we will focus on the relationship between BSRLM and Early Years mathematics education. Since June, we have been working on a review of the BSRLM Conference Proceedings related to the Early Years. These proceedings report on research presented at the BSRLM Day Conferences spanning over 40 years. Our work has raised some interesting patterns, and during this meeting, we will share our observations about the corpus of studies presented at BSRLM which focus on the Early Years. We'll look at what's been covered, what's being talked about in Early Years mathematics education and the research designs and approaches employed. In thinking about the future direction of Early Years mathematics education, we're particularly keen to hear from participants about what seems to be missing from the corpus. What hasn't been explored that you would expect to be there? Are there themes missing in the BSRLM research that are being looked at elsewhere or that tie in with current practice and policy and would be expected to be included in the research field? As always, we welcome anyone with an interest in Early Years mathematics education whether you have attended the Working Group before or not. We'll also have time for anyone to bring to the discussion anything of note to discuss in relation to Early Years and Primary Mathematics.

**Meangru, Matthew**

**[PRESENTATION]**

***Utilising artificial intelligence as a learning tool to support and coach calculus students in developing mathematical resilience***

This presentation reports on an ongoing study of Artificial Intelligence (AI) in Teaching and Learning Scholarship research, involving 32 students enrolled in a Calculus for Business course. The study focuses on students' engagement with AI as a learning tool and the development of mathematical resilience. The term mathematical resilience 'describes the positive attributes that learners require in order to be prepared to engage with, learn and use mathematics both at school and ... beyond' (Lee and Johnston-Wilder, 2016). In this study, I build upon Johnston-Wilder and Lee's (2024) methods for developing mathematical resilience by utilising AI as a learning tool. To understand the possible impacts of AI in coaching calculus students' towards mathematical resilience, data collection involves weekly written reflections by students on how they employ AI to overcome challenges and barriers in calculus. Using Clandinin's (2023) narrative inquiry approach, I then abstract these reflections to retell the stories of the students' calculus journeys and the development of their mathematical resilience. On-going findings suggest that artificial intelligence could be used effectively to reinforce calculus applications to aid in the development of mathematical resilience. This study contributes to the literature on educational applications of artificial intelligence, in particular showing how AI can be used as an emerging technological tool for developing mathematical resilience.

**Rachmanidi, Eirini\*; Christina, Misailidou**

**[PRESENTATION]**

***FractionsCoach: The design of a chatbot for enhanced fraction understanding***

This paper presents the design of "FractionsCoach", an Artificial Intelligence (AI) Chatbot developed to enhance primary school pupils' understanding of fractions. The system can operate within a web browser on any device. Its AI component is intentionally constrained and as a result, does not offer complete solutions. Instead, it restricts its output to concise prompts, targeted explanations addressing recurring conceptual challenges and a limited question-and-answer support. Its adaptive learning pathway is organised into phases with progression determined by user performance to enable differentiated pacing. The platform offers both multiple-choice questions and more complex tasks requiring contextual problem-solving, mathematical justification, and symbolic comparison. As a consequence, it facilitates transitions between representations and enhances mathematical reasoning. A key feature of the system is the provision of graduated formative feedback and, when necessary, brief targeted explanations. Interaction traces, such as activity phase or type, correctness, number of attempts, and response time, are recorded solely to support formative assessment. The design of FractionsCoach contributes to mathematics education research by proposing a chatbot which, rather than providing direct answers, offers conceptual support.

Rycroft-Smith, Lucy

[PRESENTATION]

***An analysis of early mathematical concepts in English nursery rhymes/mathematical songs***

This study examines the mathematical content of well-known nursery rhymes and/or mathematical songs commonly used in English early years settings. While songs and rhymes have been recognised as valuable pedagogical tools for early mathematics learning, little research has systematically analysed which mathematical concepts they actually support, and crucially which remain under-represented. I analysed a corpus of popular mathematical songs and traditional nursery rhymes used in English early childhood education, mapping their content against key early mathematical concepts. The analysis identified which mathematical concepts are frequently represented and which are notably absent or poorly supported. Findings reveal significant gaps in coverage of certain foundational mathematical ideas. While counting songs dominate the landscape, other crucial early mathematical competencies receive minimal attention in the existing repertoire. This uneven distribution may inadvertently shape children's early mathematical experiences and potentially contribute to gaps in conceptual development. The paper discusses implications for early years practitioners, suggesting opportunities for developing new songs to address underrepresented concepts, which is my next research project. It also raises questions about how the informal mathematics curriculum delivered through song aligns with formal learning objectives, and whether reliance on traditional songs adequately supports the breadth of mathematical thinking expected of young learners.

Sheard, Simon\*; Bell, Kirsty\*

[PRESENTATION]

***Micro steps, macro impact: Using microteaching as an authentic tool within primary maths teacher training***

Microteaching is an established tool within teacher training that gives students the chance to strengthen their initial teaching skills and allows teacher educators to provide developmental feedback (Bozkurt & Koyunkaya, [2022](#); Mukuka & Alex, [2024](#)). This presentation shares emerging research that considers undergraduate and postgraduate trainee teachers' perceptions and reflections of microteaching in their university-based maths sessions. The research explores differing perceptions of microteaching using post-session feedback. Do students value the experience? How do they feel it contributes to their pedagogical content knowledge? Is technology embraced during microteaching sessions or do students avoid it? Does microteaching leave them feeling empowered to stand and deliver in front of a class? Or does it exacerbate any pre-existing anxieties?

Sofiyana, Hana

[PRESENTATION]

*In-service teachers' beliefs about the nature of mathematics between rural and urban contexts: A beginning step towards critical mathematics education in Indonesia*

This study compares Indonesian in-service teachers' beliefs about the nature of mathematics across rural and urban contexts. Despite increasing attention to teachers' beliefs, limited research has examined how these beliefs vary across socio-geographical settings in Indonesia. A survey design was employed with 200 purposively selected teachers (100 rural, 100 urban). Data were analysed using independent t-tests to identify statistical differences and Rasch modelling to classify belief orientations. Results indicate that rural teachers are more likely than urban teachers to endorse absolutist views. However, teachers' beliefs did not align with a strict absolutist–fallibilist dichotomy. Instead, they formed hybrid and contextually mediated systems, with many participants expressing dual and sometimes conflicting orientations. Teachers recognised mathematics as both a fixed body of knowledge and a dynamic discipline, yet showed hesitation toward sociocultural interpretations. These findings challenge rigid belief classifications and highlight the socially situated nature of teachers' mathematical beliefs. The shared presence of fallibilist tendencies across contexts suggests potential for advancing Critical Mathematics Education in Indonesia by strengthening connections between mathematics, real-life situations, social issues, and local knowledge.

**Wang, Linda\*; Zhang, Wenping\*; Barmby, Patrick****[PRESENTATION]*****Assessing Chinese Grade 1 pupils' metacognition in mathematics: Comparing coding, expert comparative judgment, and AI comparative judgement methods***

The think-aloud strategy has been promoted in the new Mathematics Curriculum in Zhejiang, China. This study explores how effectively Grade 1 pupils can verbalise their thinking processes when solving number-related problems. We audio-recorded twenty-two pupils from a Grade 1 class in an urban state school and analysed the transcriptions using Desoete's framework for metacognition. Nine Grade 1 mathematics teachers evaluated the transcriptions via the No More Marking comparative judgment system. Additionally, we employed AI-based comparative judgment prompted by Desoete's framework to ensure consistent evaluation criteria. The results reveal that Grade 1 pupils demonstrated strong performance in the planning aspect of metacognition but were less proficient in monitoring and evaluation. This suggests that while young pupils can articulate initial problem-solving strategies well, they may need additional support in reflecting on and adjusting their thinking during and after problem-solving. The correlation between expert judgment and coding was .74, while the correlation between coding and AI judgment was notably higher at .83. The Inter-rated reliability measured by ICC was .866, indicating excellent consistency across rating methods. These preliminary results suggest that both AI-based comparative judgment and expert judgment are potentially effective methods for assessing metacognition in young pupils. The higher correlation between AI judgment and coding is particularly promising, indicating that properly prompted AI systems may offer a reliable and scalable approach to metacognitive assessment. However, further research is needed to refine the coding framework and conduct wider testing across different educational contexts and age groups to establish the generalisability of these findings.

**Wenderlich, Maja****[PRESENTATION]*****How to support mathematical abilities of children in early primary education? Results of research on a mathematical innovation in Nowy Sącz, Poland***

The article presents ways of supporting mathematical abilities of children in early primary education based on the results of research conducted as part of a mathematical innovation implemented in Nowy Sącz, Poland, between 2020 and 2026. The aim of the study was to assess the effectiveness of innovative teaching methods focused on developing mathematical thinking, creativity, and motivation among students in grades 1–3. Both qualitative and quantitative research methods were applied, including pedagogical observation and analysis of students' achievements. The results indicate that the systematic use of activating teaching strategies, problem-solving tasks, and play-based elements fosters the development of children's mathematical abilities and positively influences their attitudes toward learning mathematics.

**Worley, Annie**

**[PRESENTATION]**

***Accounting for absence: Secondary school maths teachers, Piaget and manipulatives***

'Diversity in learning' is one theme identified as part of the data analysis from a PhD research study, exploring why manipulatives are not commonly used in secondary school maths teaching. The effect of Piaget's theory of stages of development within the education system is considered as a possible reason. Specifically, his idea that children at the age of 12 are able to forego concrete operational thinking and work purely in the abstract. Whilst the use of manipulatives in Primary School is prevalent, in Secondary schools rather than being seen as a valuable tool for all students, manipulatives have tended to be associated with support for Special Educational Needs pupils. The project looks at the differing experiences of six secondary maths PGCE students using the framework of hermeneutic phenomenology. Interviews were carried out at three critical points in their training to gain an insight into what beliefs are brought into education, and the effect that lectures and placements have on the use of manipulatives in the classroom. The theme of 'diversity in learning' explores how the teacher training students encounter difference in terms of age, ability, relevance and setting; and whether there is a subconscious allegiance to Piaget's stages of development which affects this.

**Zhu, Rongxin**

**[PRESENTATION]**

***Implementing mathematical literacy across contexts: A comparative analysis of Indonesia, South Africa, and China***

Mathematical literacy has emerged globally as an educational goal, yet its implementation varies widely, shaped by differing curriculum structures, assessment regimes, and underlying cultural perceptions. This paper presents a comparative analysis of how mathematical literacy is conceptualised and enacted in three contrasting education systems: Indonesia, South Africa, and China. Drawing on a qualitative synthesis of curriculum policy documents, assessment frameworks, and research literature, the presentation explores how mathematical literacy has been incorporated in distinct national curricula and the differences in their implementation. The analysis focuses on three dimensions of implementation: (1) the role of assessment in shaping classroom practice, (2) the positioning of mathematical literacy in relation to disciplinary mathematics, and (3) the implications for teachers' pedagogical practices and professional identity. By juxtaposing different models, the paper argues that mathematical literacy cannot be understood as a uniform construct; rather, it represents a family of practices shaped by local educational priorities and reform trajectories. The presentation contributes to ongoing debates by highlighting trade-offs inherent in different implementation models and by offering a conceptual framework for analysing mathematical literacy beyond achievement outcomes, with implications for curriculum design, teacher education, and comparative mathematics education research.