ICTMA Newsletter
Volume 13 Number 1 May 2026

Dear ICTMA friends...

this first ICTMA Newsletter of 2026 brings you news from the field of mathematical modelling on an international level. This issue features a selection of recent publications by ICTMA members in journals and books, as well as recently completed dissertations and master's theses.

Xiaoli Lu reports on innovative projects in Shanghai that bridge the gap between university teacher training and school practice.

Additionally, Drawing on Ken Houston's review of the first 20 years of ICTMA, we are calling for the subsequent decades from 2003 onwards to be documented, ensuring the ongoing development and new challenges facing our community are recorded.

We would like to thank all colleagues who contributed to this newsletter with their comments and texts. We also welcome contributions for the next issue, including details on publications, projects, dissertations, and news.

Gilbert Greefrath

News

Call for Expression of Interest to hold ICTMA 24

Any groups considering hosting ICTMA 24 in 2029 are invited to send a written Expression of Interest to the President of ICTMA Vince Geiger by 15th July 2026. Full conference bids for selected groups will be due in April 2027.

ICTMA book series

The latest volume in the ICTMA series is now available from Springer. Featuring a comprehensive collection of research and contributions from ICTMA-21 in Awaji, this new release is titled 'International Horizons in Mathematics Modelling Education'. Edited by Toshikazu Ikeda, Akihiko Saeki, Vince Geiger and Gabriele Kaiser, it brings together diverse global perspectives on the evolution of mathematical modelling in education.

ICTMA 23

The next ICTMA conference, will take place in Kruger National Park, South Africa from 22-27 August 2027.

The real world and mathematical modelling are intertwined and **ICTMA23**, to be held in the heart of nature, will remind the local and international community of this connection and will provide a golden opportunity for showcasing research, sharing ideas and taking part in discussions. We invite all researchers, teachers and mathematicians interested in the teaching and learning of mathematical modelling to take part in the event, hosted by the University of the Witwatersrand in the Kruger National Park at Skukuza from 22 – 27 August 2027.
The theme at ICTMA23 is “Context and Diversity, and its Meaning in Mathematical Modelling Education”.

We are pleased to announce that the **submission process for abstracts** will commence on **1 August 2026**. Following this, **registration for the congress and accommodation bookings** will officially open on **1 September 2026**. We look forward to welcoming you in South Africa!
Visit the website for more (and regularly updated) information:
https://ictma23.carlamani.com/

Rina Durandt (Chair ICTMA23)

Master Thesis and Dissertations

The ICTMA community continues to see exciting developments from its researchers worldwide. We are pleased to share the following academic milestones and publications:

- Korea University, Seoul, Korea:
  Hee-jeong Kim reports that her student, **Chaewon Hwang**, has successfully completed her master's thesis, "Developing and Applying a Digital-Integrated Mathematical Modeling Framework in Statistical Contexts." Her research offers critical insights into how digital tools support engagement in statistical modeling. Chaewon has now transitioned into the PhD program at Korea University, where she will expand her focus to include AI environments.

- University of Hamburg, Germany:
  Two significant doctoral projects were recently completed under the supervision of Prof. Dr. Gabriele Kaiser:

  Deike Alfke completed her PhD with a thesis entitled "Gestufte Lernhilfen beim mathematischen Modellieren" (Increasing Learning Aids in Mathematical Modelling). Through videotaped teaching units, she analyzed how scaffolding via tiered learning aids supports learners. Her dissertation will be published in the Springer series "Perspektiven der Mathematikdidaktik" in 2026.

  Alina Alwast completed her PhD with her dissertation, "Pre-service Teachers' Noticing of Students' Mathematical Modelling Processes." Her project involved developing a video-based instrument to analyze how pre-service teachers identify students' modelling difficulties and metacognitive strategies. This cumulative work includes five articles, most recently: Alwast & Vorhölter (2025) in the Asian Journal for Mathematics Education. Her full dissertation is also set for publication in the "Perspektiven der Mathematikdidaktik" series.

We congratulate Chaewon, Deike, and Alina on their impressive achievements and their valuable contributions to the field of mathematical modelling education!

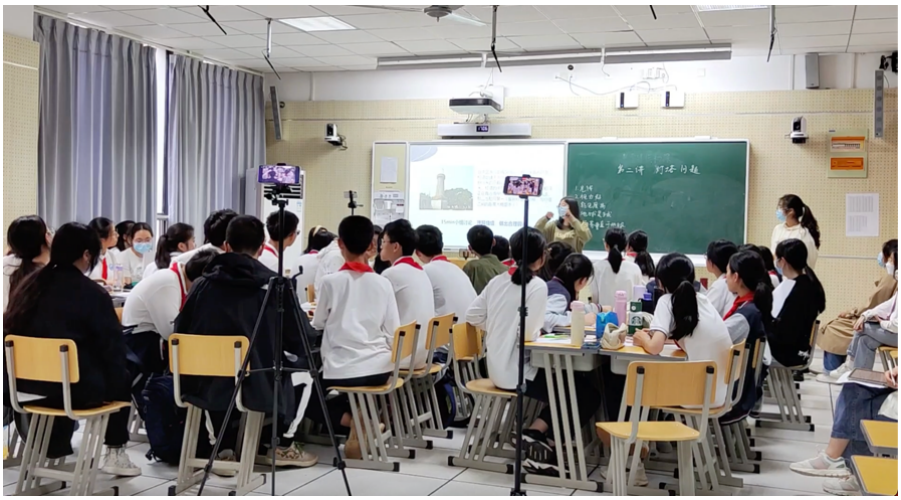
Mathematical Modelling Activities in Shanghai Schools

By Xiaoli Lu (East China Normal University, Shanghai)

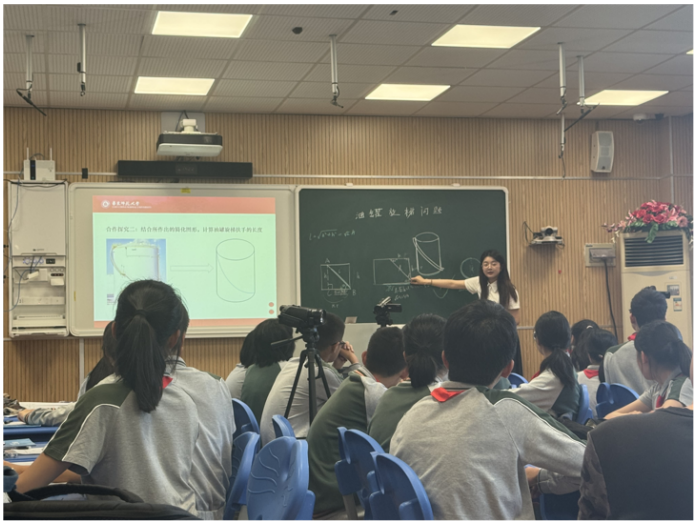
Since 2023, a series of mathematical modelling activities in middle schools in Shanghai has been organized by the mathematics education group at East China Normal University. These initiatives aim to strengthen the connection between university-based teacher education and authentic classroom practice, while also promoting the development of mathematical modelling education in secondary schools. Two main types of activities have been developed within this initiative:

The first type focuses on school-based modelling practice involving pre-service teachers. In collaboration with local middle schools, pre-service mathematics teachers support Grade 8 students while working on real-world mathematical modelling tasks. In these activities, pre-

service teachers take on different roles within students' modelling processes. As guiding teachers, they support students in structuring the modelling process—from understanding the real-world situation, to constructing mathematical models, working mathematically, and interpreting and validating results. As scaffolding teachers, they work closely with student groups, providing timely hints, scaffolds or interventions when needed. As observing teachers, they document and reflect on interactions among teachers and students during group-based modelling activities. Through these complementary roles, pre-service teachers gain rich opportunities to engage with both the instructional and analytical dimensions of mathematical modelling.



The second type builds on a widely used teaching-and-research tradition in China, often referred to as "same content, different lesson designs," which is closely related to the approach of collaborative lesson study. This approach is adapted to mathematical modelling activities by engaging different groups of pre-service teachers to design and implement lessons based on the same modelling task in separate Grade 8 classes. Such an arrangement creates structured opportunities for comparison, reflection, and professional dialogue. By examining how different instructional designs influence students' modelling processes and learning experiences, pre-service teachers are able to learn from one another and develop a deeper understanding of effective modelling pedagogy.



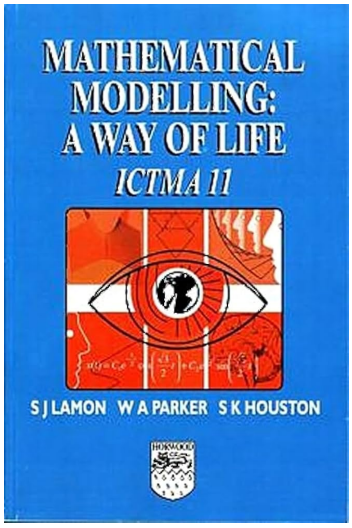
In addition to their practical value, these activities also serve as a research platform. Drawing on classroom implementations of modelling tasks, recent studies have examined students' motivational and emotional experiences during the modelling process, highlighting, for example, the important role of curiosity in fostering engagement and deeper learning (Lu et al., 2026).
Together, these two types of activities not only support students' engagement with mathematical modelling but also contribute to the professional development of future mathematics teachers and to research on modelling pedagogy in authentic school settings.

Lu, X., Chen, X., Chen, Y., & Kaiser, G. (2026). Motivation and epistemic emotions in mathematical modelling. *ZDM – Mathematics Education*. https://doi.org/10.1007/s11858-026-01770-y

A look back: 20 years twice over, and even more ICTMA

In 2003, Ken Houston's article "ICTMA: The First 20 Years" was published. In this article, the author discusses the origins of the mathematical modelling movement, as well as the ICTMA conferences and their development during the last quarter of the 20th century. The text draws on the author's personal experiences and the biennial ICTMA publications.

In his article "ICTMA: The First 20 Years", Ken Houston explains that the founding of the International Community of Teachers of Mathematical Modelling and Applications (ICTMA) is closely linked to the 1973 McLone Report. This report critically highlighted that, whilst mathematics graduates possessed technical knowledge, they exhibited significant shortcomings in problem formulation, communication and teamwork. Houston describes how these findings were reinforced by further influential publications such as the Cockcroft Report and recommendations from the Mathematical Association of America, which called for students to gain experience with real-world modelling projects at an early stage. In this context, he highlights David Burghes as a driving force who, through teacher workshops and the founding of the Spode Group in the UK, promoted the practical implementation of modelling tasks in school lessons. According to Houston, the first official international conference finally took place in July 1983 at the University of Exeter, bringing together 125 delegates from 23 countries, with topics such as group work and assessment already at the centre of the debates at that time.



For the subsequent phase of the 1980s and early 1990s, Houston describes how the community expanded beyond the borders of the UK to the European mainland, with seminal conferences in Kassel, Roskilde and Noordwijkerhout. He explains that during this period the theoretical foundations of the movement were significantly refined, with scholars such as Mogens Niss introducing important conceptual distinctions between the mathematical model as a result and modelling as a dynamic process, as well as the concept of mathematisation. According to Houston's account, the ICTMA finally attained the status of a global organisation at its tenth anniversary conference in 1993 in Newark, USA. The subsequent meetings in Belfast, Brisbane, Lisbon and Beijing reflected the growing diversity of topics, which now also

encompassed the use of modern technologies and philosophical perspectives on the learning process.

According to Houston, the professionalisation of the community culminated around the turn of the millennium in a structural reorganisation, marking the transition from an informal organising committee to a democratically elected executive with a fixed constitution. A decisive milestone in this development was the recognition of the ICTMA as an official study group of the International Commission on Mathematical Instruction (ICMI). Houston concludes his review with the 2003 conference in Milwaukee, noting that this marked the end of an era in which modelling had matured from a marginal phenomenon into a central, scientifically grounded component of educational curricula.

Looking back on this successful founding phase described by Houston, it becomes clear how important it is to continue this process of documentation and now also to document the subsequent decades of ICTMA's history, in order to record the community's ongoing development and new challenges. A continuation of this report would not only reflect the rapid technological progress and further global networking since 2003 but also show how the community has responded to new challenges in education policy. This is a call to all ICTMA members to record the milestones from 2003 onwards, so that the valuable experience in teaching modelling skills is preserved for future generations of teachers and learners.

We look forward to your contributions! Gilbert Greefrath

Recent Publications

Albarracín, L., & Ärlebäck, J. B. (2025). Exploring the role of assumptions in mathematical modeling teacher training using Fermi problems. *ZDM – Mathematics Education*, *57*(2–3), 213–228. https://doi.org/10.1007/s11858-025-01677-0

Alwast, A., & Vorhölter, K. (2025). Exploring competence profiles of pre-service teachers' noticing of students' mathematical modelling processes: A type-building analysis. *Asian Journal for Mathematics Education*, *4*(4), 462–487. https://doi.org/10.1177/27527263251399988

Baumann, O., Gödecke, P., Quarder, J., Schukajlow, S., Schindler, M., & Schoenherr, J. (2026). Examining the role of drawing construction and use in mathematical modelling – an eye-tracking study. *ZDM – Mathematics Education*, *58*(3), 521–537. https://doi.org/10.1007/s11858-026-01774-8

Borromeo Ferri, R., & Greefrath, G. (2026). Pre-service teachers' assessment competence for grading students' solutions of mathematical modelling problems. *Teaching and Teacher Education*, *169*, 105281. https://doi.org/10.1016/j.tate.2025.105281

Cevikbas, M., & Kaiser, G. (2026). The use of large language models to solve mathematical modeling problems: Preservice mathematics teachers' use practices, perceived affordances and challenges, and trustworthiness judgments of AI-generated outputs. *ZDM – Mathematics Education*. https://doi.org/10.1007/s11858-026-01786-4

Durandt, R. (2026). What first-year students' prior mathematical knowledge reveals for modelling-oriented university mathematics teaching. *African Journal of Teacher Education and Development*, *5*(1), a161. https://doi.org/10.4102/AJOTED.v5i1.161

Gallart, C., Ferrando, I., Segura, C., & Albarracín, L. (2026). Modelling with AI: How complexity and experience shape ChatGPT use by pre-service teachers. *Eurasia Journal of Mathematics, Science and Technology Education*, *22*(4), em2816. https://doi.org/10.29333/ejmste/18263

Kularajan, S., & Czocher, J. A. (2025). The Role of Reasoning with Quantities in Undergraduates' Modeling Activities. *International Journal of Research in Undergraduate Mathematics Education*. https://doi.org/10.1007/s40753-025-00273-7

Lu, X., Chen, X., Chen, Y., & Kaiser, G. (2026). Motivation and epistemic emotions in mathematical modelling. *ZDM – Mathematics Education*. https://doi.org/10.1007/s11858-026-01770-y

Schlüter, D., Hagena, M., Göller, R., Besser, M., & Padberg-Gehle, K. (2026). Education for sustainable development through mathematical modelling in higher education: Conceptual considerations, empirical explorations and implications. *International Journal of Mathematical Education in Science and Technology*, 1–23. https://doi.org/10.1080/0020739X.2026.2633244

Shahbari, J. A. (2026). ChatGPT Bot–Mediated Modeling: Tracing Prospective Teachers' Modeling Processes through an Instrumental Genesis Lens. *International Journal of Science and Mathematics Education*, *24*(5), 43. https://doi.org/10.1007/s10763-026-10668-w

Yata, K., Saeki, A., Kawakami, T., & Ikeda, T. (2026). Facilitating Authentic Problem Posing in Mathematical Modelling: A Case of 12th-Grade Students. In J. Cai & R. Leikin (Eds), *Research in Mathematical Problem Posing* (pp. 409–427). Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-05493-7_20

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Please send future contributions to the editor by email <greefrath@uni-muenster.de>. The next newsletter will be published at the end of 2026. We are interested in your contributions to any of the current sections including project reports and news.
