

Newsletter

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Report from Latest Conference ICTMA21 in Awaji, Japan

by Toshikazu Ikeda and Akihiko Saeki

ICTMA21 was successfully organized by the Local Organizing Committee (LOC) of Japan. It was chaired by Prof. Toshikazu Ikeda and vice-chaired by Prof. Akihiko Saeki and Prof. Keiichi Nishimura. The conference took place in person from September 10th to 15th, 2023. It adhered to the theme 'Collaboration in Mathematical Modelling Education,' emphasizing the significance of collaboration among students, teachers, researchers, and industry professionals.

Based on the feedback received from the participants, the organizers confidently conclude that the conference was a resounding success. For the first time, an Early Career Researcher Day was incorporated into the ICTMA meeting. It featured lectures by Prof. Gabriele Kaiser, Şerife Sevinç, and Gloria Stillman.

The scientific program included a joint keynote speech by Prof. Merrilyn Goos and Prof. Susana Carreira titled *Conceptualising the relationship between mathematical modelling and interdisciplinary stem education*, three plenary lectures: Prof. Gilbert Greefrath's *Teacher education and mathematical modelling: pre-service teachers' professional competence for the teaching of mathematical modelling*, Prof. Jennifer A. Czochoer's *In their own words: explanations of stem students' reasoning during mathematical modelling*, and Prof. Yoshinori Shimizu's *Lesson study and its relations to mathematical modelling*. A plenary panel discussion

took place led by Prof. Jonas Bergman Ärlebäck (Chair), Prof. Jinfa Cai, Prof. Gabriele Kaiser, and Prof. Roza Leikin on the topic of *Relations among problem solving/posing, creativity, and mathematical modelling*. Additionally, a special lecture titled *IMMC: Celebrating 10 years of influencing educational change* was delivered by Prof. Benjamin Galluzzo and Alfred Cheung.



The opening ceremony took place on September 10th. Prof. Toshikazu Ikeda, the Chair of the Local Committee, along with Prof. Gabriele Kaiser, President of ICTMA, and Prof. Yoshinori Shimizu, President of JSME, delivered welcoming remarks. The ceremony concluded with a performance of the traditional Japanese musical art form, known as the Koto. During the evenings of Monday and Tuesday, participants gathered for a happy hour. This provided an opportunity for individuals from diverse backgrounds and cultures to share their experiences and strengthen their relationships. On Thursday, two types of excursions to Kyoto and Himeji Castle were organized.

Friday featured the general meeting, during which Prof. Vince Geiger was nominated and confirmed as the new President of ICTMA. Additionally, Prof. Gilbert Greefrath and Prof. Milton Rosa were appointed as international executive members. Prof. Gabriele Kaiser was confirmed as co-opted member as well as Dr. Rina Durandt and Prof. Angeles Dominguez.



President and members of the international executive committee:

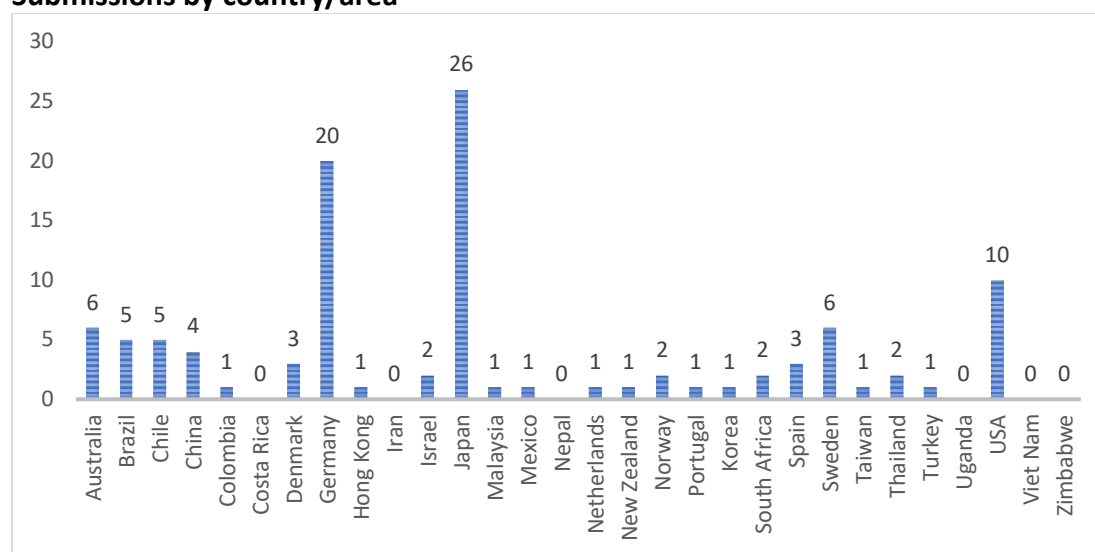
Toshikazu Ikeda, Angeles Dominguez, Vince Geiger (President), Gabriele Kaiser, Gilbert Greefrath, Jennifer Czoher, Milton Rosa (not on the photo: Jonas Bergman Ärlebäck, Rina Durandt, Hans-Stefan Siller)

The revised constitution of ICTMA was discussed and approved through a vote. The conference dinner featured a captivating performance of the traditional Japanese Taiko drumming, which was thoroughly enjoyed by the attendees.

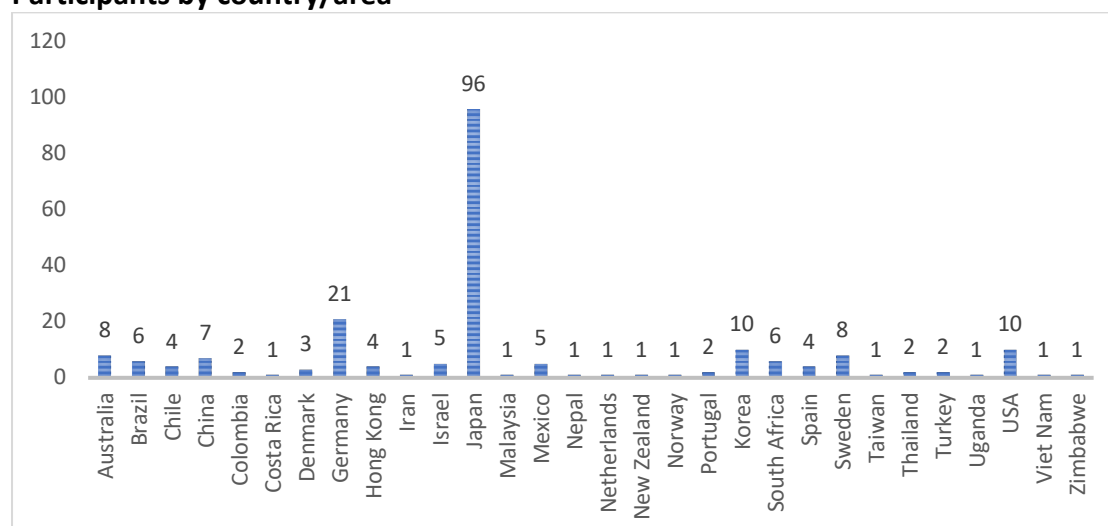
The conference closed after the panel discussion with the Henry Pollak Award ceremony honoring Prof. Gloria Stillman. During the closing ceremony, Professor Toshikazu Ikeda, the Local Committee Chair, and Prof. Gabriele Kaiser, President of ICTMA, expressed their gratitude to all participants. Prof. Jonas Bergman Ärlebäck and Prof. Peter Frejd announced that the next ICTMA22 will be held in Sweden. The ceremony concluded with another enchanting performance of the traditional Japanese musical art form, the Koto.

The conference featured a total of 107 accepted long/short presentations and poster sessions, with a total of 216 registered participants.

Submissions by country/area



Participants by country/area



The Henry Pollak Award 2023

The ICTMA Career Research medal named The Henry Pollak Award established at ICTMA18 in 2017 in Stellenbosch has been awarded for the second time in 2023. The award of this medal reflects ICTMA's pride in an ICTMA member's outstanding research in mathematical modelling education. The ceremony took place in 2023 at the official ICTMA21 conference in Japan.



The Henry Pollak Award is awarded to **Prof. Dr. Gloria Ann Stillman** on the grounds of her impressive contribution and engagement to mathematical modelling and the ICTMA community.



The award winner G. A. Stillman (right) with laudator G. Kaiser (left)

Citation for the awarding of the Henry Pollak Award 2023 to Gloria Ann Stillman
by Gabriele Kaiser

The Henry Pollak Award in 2023 goes to Gloria Ann Stillman as she is fulfilling the criteria of the award in an outstanding way.

1. For three decades, Gloria Stillman has been an active and prolific researcher within the field of mathematical modelling and applications in (primarily secondary) mathematics education and related areas such as problem solving, cognitive demand and metacognition as well as teacher education. Her research achievements are certainly sustained and distinguished, both in quantitative and in qualitative terms, and have been exhibited in many publications in high-ranking research journals, prestigious books, influential conference proceedings, and scholarly reports. Many of her publications have significantly contributed to shaping the field of mathematical modelling educational research, especially her work on modelling contexts,

assumptions, blockages, and enablers as well as on metacognition, themes on which she has collaborated extensively with other protagonists in the field.

2. In addition to its manifest impact within her primary area of research, Gloria Stillman's research has had a broad impact on curriculum change and development nationwide in Australia, and in particular in the states of Queensland and Victoria, where she is also a co-author of a series of secondary mathematics textbooks. Her research has also had an impact on research and practice in the teaching of secondary school mathematics at large, as is reflected in an award-winning book with two co-authors. Also, her work on metacognition and on the use of digital technologies to support real-world problem solving has proved very influential, in particular her studies of the role of anticipatory metacognition in the broader context of STEM education.

Gloria's impact has not only flown from her research studies and publications. She has also played a significant part in mentoring doctoral and other students - secondary, tertiary as well as graduate students, including several graduate students from other countries.

3. When it comes to active and participatory scholarship within the field of mathematical modelling education research, Gloria Stillman's record of quality is remarkable. She has participated in being an invited speaker (several times in a keynote role) at a large number of conferences on but also beyond mathematical applications and modelling in mathematics education. Moreover, she has been a member of several committees within the field, including organising committees of high-profile conferences and sub-conferences, such as ICME Topic Study Groups. She has been an editor or co-editor of several books and book series – including Springer's International Perspectives on the Teaching and Learning of Mathematical Modelling - as well as special journal issues on mathematical modelling educational research and related areas. This has already been mentioned during the conference several times.

Gloria is well connected within a great network of collaborators and close colleagues from all over the world, with many of whom she has been engaged in numerous research projects, oftentimes of a long duration.

4. Not many protagonists in mathematical modelling education research can muster a record of long-standing research-related contributions and service to ICTMA similar to Gloria's. She has been an active member of ICTMA since 1997 and has presented research at almost every ICTMA since then. She was the chair and co-organiser of ICTMA15 in Melbourne. She has contributed substantially to the ICTMA books, of which she has been a co-editor of several volumes. She developed the ICTMA Newsletter, which she edited 2007-2017. She was an elected member of the ICTMA International Executive 2007-2019, serving as its Secretary 2009-2015 and as ICTMA President 2011-2019.

Against this background, it is evident that Gloria Ann Stillman is an eminently worthy recipient of the Henry Pollak Award for 2023.

Welcome to ICTMA 22 in Linköping, Sweden, August 10-15, 2025

by Jonas Bergman Ärlebäck and Peter Frejd

In 1989 the fourth International Conference on Teaching of Mathematical Modelling and Application (ICTMA4) was arranged in Roskilde in Denmark. For ICTMA22 in 2025 we extend an invitation to all researchers, teachers and mathematicians interested in the teaching and learning of mathematical modelling and applications to return to Scandinavia again – but this time to Sweden and the city of Linköping! August the 10th an early research career day is planned as is the welcome reception. The official academic program will start on August 11th. <https://liu.se/en/article/international-conference-ictma22>

News

- The journal *Computation* published by MDPI is in the process of soliciting articles for the special issue “Computations in Mathematics, Mathematical Education, and Science”. If you are interested in contributing an article to this special issue, please visit https://www.mdpi.com/journal/computation/special_issues/56MLF9N68C. I was recruited to serve as Guest Editor for the special issue. Thank you for your attention to this announcement (*Sergei Abramovich*)
- A **new book** in the series "International Perspectives on the Teaching and Learning of Mathematical Modelling" is published. This volume provides a snapshot of the current state-of-the-art in theory, research, and practice in the area of mathematical modelling in education. The various chapters reflect the work carried out at **ICME-14** held in Shanghai in July 2021, within the scope of Topic Study Group 22 and Survey Team 4: Greefrath, G., Carreira, S. P., & Stillman, G. A. (Eds.). (2023). *Advancing and Consolidating Mathematical Modelling: Research from ICME-14*. Springer.

News from Brazil

The XII CNMEM marks the face-to-face meeting of the Brazilian community

by Débora Da Silva Soares

Between August 24 and 26, 2023, the Federal University of Rio Grande do Sul (UFRGS) hosted the XII National Conference on Modelling in Mathematics Education, in the city of Porto Alegre, RS, Brazil. With the theme “Mathematical Modelling in Pandemic Times: challenges, perspectives and values”, the event marked the face-to-face meeting of the Brazilian community of Mathematical Modelling in Mathematics Education after a 4-year gap without the event being held due to the Covid-19 pandemic.



The event was attended by students, teachers and researchers from 5 regions of Brazil, totalizing 11 states and the Federal District. Additionally, it received participants from Colombia. There were 236 registrants and 94 work presentations, in the modalities of Scientific Communication, Experience Report and Posters, in addition to the Opening Lecture, a Conversation Circle, four Thematic Debates and the Closing Panel.

In an atmosphere of joy and emotion, the event provided several reunions, new meetings, alignment of partnerships, as well as the sharing of research and experiences developed and lived by the participants. In many instances there were memories about Ubiratan D'Ambrosio, and the event ended with his picture being shown to the audience!

Highlights of the event were the display of part of the collection from the Women in Mathematics Exhibition, which seeks to emphasize the female presence in the area; the availability of part of the IMEzinho collection, a space created at the Institute of Mathematics and Statistics (IME) at UFRGS that aims to offer some support to mothers and fathers with children who attend the institute; and receiving the IME's Diversity Stamp, which aims to guarantee diversity in events held by the institute.

For more information about the event, including access to the proceedings, you can access the website www.ufrgs.br/cnmem and the Instagram account @12cnmem. We invite the ICTMA community to participate in the next editions of the event!

NEWS ABOUT BRAZIL'S MATHEMATICAL MODELING WORKING GROUP

by Elizabeth Souza and Adriana Borssoi

Still in the Brazilian context, the researchers are preparing to submit their work to the IX International Seminar on Research in Mathematics Education (SIPEM), where, grouped in Working Group number 10 (WG-10) of the Brazilian Society of Mathematical Education (SBEM). They will discuss consolidated research in the area in debates with other fields of research. We invite the ICMTA community to submit papers to Working Group WG-10 to be evaluated and debated at the SIPEM. The event will be held in November 2024. Detailed information will be available on the website shortly:

<http://www.sbembrasil.org.br/sbembrasil/>

Recent Dissertations

- Kawakami, T. (2023). *Research on the learning and teaching of data-driven modelling in school mathematics* (unpublished doctoral dissertation). The Joint Graduate School (Ph.D. Program) in Science of School Education Hyogo University of Teacher Education. Supervisors: Akihiko Saeki, Kazuhiko Nunokawa, & Yoichi Maeda.
- Spooner, K. (submitted) *Exploring Tertiary Students Mathematical Modelling Experiences: Insights for Practice*. The oral examination is scheduled for the end of November.

Recent Publications of Interest

- Ärleback, J. B., & Albarracín, L. (2023). Fermi problems as a hub for task design in mathematics and stem education. *Teaching Mathematics and Its Applications: An International Journal of the IMA*, hrad002. <https://doi.org/10.1093/teamat/hrad002>
- Auning, C., & Auning, M. (2023). Students' explanations of a complex natural phenomenon using mathematical modeling as a design feature in a model-based inquiry unit. *Nordic Studies in Science Education*, 19(1), 62–77. <https://doi.org/10.5617/nordina.8965>
- Cevikbas, M., Greefrath, G., & Siller, H.-S. (2023). Advantages and challenges of using digital technologies in mathematical modelling education – a descriptive systematic literature review. *Frontiers in Education*, 8, 1–17. <https://doi.org/10.3389/feduc.2023.1142556>
- Frejd, P., & Vos, P. (2024). The spirit of mathematical modeling – a philosophical study on the occasion of 50 years of mathematical modeling education. *The Mathematics Enthusiast*, 21(1–2), 269–300. <https://doi.org/10.54870/1551-3440.1626>
- Fukushima, T. (2023). The role of generating questions in mathematical modeling. *International Journal of Mathematical Education in Science and Technology*, 54(5), 827–859. <https://doi.org/10.1080/0020739X.2021.1977402>
- Gerber, S., Quarder, J., Greefrath, G., & Siller, H.-S. (2023). Promoting adaptive intervention competence for teaching simulations and mathematical modelling with digital tools: Theoretical background and empirical analysis of a university course in teacher education. *Frontiers in Education*, 8, 1141063. <https://doi.org/10.3389/feduc.2023.1141063>
- Hartmann, L.-M., Krawitz, J., & Schukajlow, S. (2023). Posing and Solving Modelling Problems—Extending the Modelling Process from a Problem Posing Perspective. *Journal Für Mathematik-Didaktik*, 44(2), 533–561. <https://doi.org/10.1007/s13138-023-00223-3>
- Jung, H., & Magiera, M. T. (2023). Connecting mathematical modeling and social justice through problem posing. *Mathematical Thinking and Learning*, 25(2), 232–251. <https://doi.org/10.1080/10986065.2021.1966713>
- Kanefke, J., & Schukajlow, S. (2023). I find this task interesting, so do you? Preservice teachers' judgments of students' enjoyment, boredom, and situational interest regarding tasks with and without a connection to reality. *Journal of Mathematics Teacher Education*. <https://doi.org/10.1007/s10857-023-09581-8>
- Khamidov, J. A., & Akhadova, K. (2023). The role of mathematics in the formation of design competence of future architects and building engineers. *Science and Innovation*, 2(1), 97–102. <https://doi.org/10.5281/ZENODO.7541432>

- Lopes, A. P. C. (2022a). Advanced algebraic thinking processes in students' modelling activities. *Teaching Mathematics and Its Applications: An International Journal of the IMA*, hrac024. <https://doi.org/10.1093/teamat/hrac024>
- Lopes, A. P. C. (2022b). Aspects of attitudes towards mathematics in modeling activities: Usefulness, interest, and social roles of mathematics. *International Electronic Journal of Mathematics Education*, 17(4), em0711. <https://doi.org/10.29333/iejme/12394>
- Lopes, A. P. C. (2023). Critical consciousness in engineering education: Going beyond critical thinking in mathematical modeling. *European Journal of Engineering Education*, 1–24. <https://doi.org/10.1080/03043797.2023.2203082>
- Meyer, J. F. C. A., & Lima, M. (2023). Relevant mathematical modelling efforts for understanding COVID-19 dynamics: An educational challenge. *ZDM – Mathematics Education*, 55(1), 49–63. <https://doi.org/10.1007/s11858-022-01447-2>
- Schukajlow, S., Krawitz, J., Kanefke, J., Blum, W., & Rakoczy, K. (2023). Open modelling problems: Cognitive barriers and instructional prompts. *Educational Studies in Mathematics*. <https://doi.org/10.1007/s10649-023-10265-6>
- Spooner, K. (2023). Using mathematical modelling to provide students with a contextual learning experience of differential equations. *International Journal of Mathematical Education in Science and Technology*, 1–9. <https://doi.org/10.1080/0020739X.2023.2244472>
- Steffensen, L. (2023). Sustainability and mathematical modelling in 5th grade. *Prometeica - Revista de Filosofía y Ciencias*, 27, 241–251. <https://doi.org/10.34024/prometeica.2023.27.15290>
- Steffensen, L., & Kasari, G. (2023). Integrating Societal Issues with Mathematical Modelling in Pre-Service Teacher Education. *Education Sciences*, 13(7), 721. <https://doi.org/10.3390/educsci13070721>
- Stohlmann, M., & Yang, Y. (2023). Investigating the alignment to mathematical modelling of teacher-created mathematical modelling activities available online. *International Journal of Mathematical Education in Science and Technology*, 54(5), 671–686. <https://doi.org/10.1080/0020739X.2021.1961030>
- Wang, T., Zhang, L., Xie, Z., & Liu, J. (2023). How does mathematical modeling competency affect the creativity of middle school students? The roles of curiosity and guided inquiry teaching. *Frontiers in Psychology*, 13, 1044580. <https://doi.org/10.3389/fpsyg.2022.1044580>

Thanks

We would like to thank all colleagues who have contributed to this newsletter with their comments and texts.

ICTMA -

The International Community of Teachers of Mathematical Modelling and Applications

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Please send future contributions to the editor by email <greefrath@uni-muenster.de>. The next Newsletter will be published in March 2024. We are interested in your contributions to any of the current sections including project reports and problems.
