ICMI Column

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Mathematics education for humanity in the work of ICMI

Introduction

For decades, in the community of mathematics educators, we have been discussing moves from 'mathematics' and 'education' to 'mathematics education,' alongside the relative distances between 'mathematics' and 'mathematics education,' and between 'education' and 'mathematics education.' Today, we know that there are also questions about the relative distance between 'mathematics education' and 'humanity.' For instance, what mathematics education aspects might be unrelated to humanity, that is, unrelated to the challenges that humanity faces, including helping people act in ways that are humanitarian?

Even if the role of mathematics education in the present and future is undeniable, a question is, therefore, mathematics education for what? In the work of the International Commission on Mathematical Instruction (ICMI), the importance of mathematics education for humanity remains a continuing invariant. The ICMI work is in this sense a strong instance of the relationship between 'mathematics education' and 'humanity.' A global understanding of mathematics education confronted with challenges that range from alleviating suffering and lessening vulnerability to reducing social, economic and environmental risk, in the spirit of the Universal Declaration of Human Rights [12], adds value to a diversity of ICMI initiatives.

In this brief text, I develop the argument of the relationship between 'mathematics education' and 'humanity' in the work of ICMI with a focus on the most present times. I choose the following four lines of evidence: (1) the scientific program of the 15th International Congress on Mathematical Education (ICME), (2) the launch of ICMI Study 27 "Mathematics Education and the Socio-Ecological," (3) the ICMI's second and seventh Felix Klein Medals to Professors Ubiratan D'Ambrosio and Alan Bishop, and (4) the creation and enactment of the Capacity and Networking Project (CANP).

The interest of ICMI in issues of mathematics education for humanity, and the question of mathematics education for what, certainly parallels the interest of the International Mathematics Union (IMU) in issues of mathematics for humanity, and the question of mathematics for what. Christiane Rousseau, at the time of her IMU vice-presidency, wrote a beautiful editorial for the IMU Newsletter [10] about the role of mathematics as a powerful tool for issues of sustainable development in its three dimensions: social, economic and environmental. Recently, IMU signed the commitment with the 2024–2033 International Decade of Sciences for Sustainable Development [11, 13]. For the case of mathematics for humanity and IMU, thus, several lines of evidence could also be detailed. Moreover, for both ICMI and IMU, a basic premise is the solid link between goals of sustainable development and goals of humanity. Sustainable development demands are viewed as necessarily having humanitarian connotations and consequences, and vice versa.

First line of evidence

ICME is the major international conference in mathematics education. The next meeting, ICME-15, will take place this coming summer in Sidney, Australia, from 7 to 14 July. In the detailed program of ICME-15,[1] some primary emphases are on the function of mathematics education to achieve healthier and more equitable societies. A considerable number of plenary and parallel activities are aimed at encouraging mathematics educators to relate the field of knowledge with issues for humanity and sustainable development. The theme and description for the plenary panel 1 reads as follows:

> *Mathematics education effectively responds to humanity's problems: Panelists will explore the interaction between mathematics education and issues of enormous importance to society, such as climate change, pandemics, international conflicts, and ongoing inequities. What role, if any, should mathematics education play beyond ensuring that countries have mathematical literate citizens? What are the ethical and practical challenges?*[2]

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[1] Available on the Congress website: https://icme15.org.

[2] https://icme15.org/icme-15-scientific-program/icme-15-plenary-events

The list of "possible topics for discussion groups" includes:

Climate change and sustainability; Social justice, poverty, and inequality; Citizenship, democracy, and fake news; Displaced people, peace, and justice; Indigenous knowledges and decolonising mathematics; Contemporary gender issues (transgender, gender diversity etc.); Artificial Intelligence; Pandemics, wellbeing, and resilience.[3]
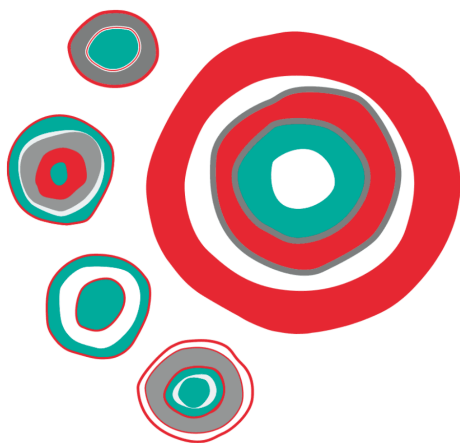

Figure 1. The ICME-15 logo.
(Design by Saretta Fielding, from the Wonnarua Nation.)

The ICME-15 logo[4] provides more emphases on mathematics education for alleviating suffering, reducing risk and lessening vulnerability. In this logo (see Figure 1), the large circle represents the importance of mathematics in everyday lives, and the smaller circles represent delegates from around the world, depicted as stepping-stones that provide the ability to expand our knowledge. The logo design and its explanation acknowledge the First Nations people, including teachers and learners of mathematics whose mathematical knowledge, languages and cultures have historically been marginalized in Australian mathematics schools and throughout the world. This acknowledgment particularly recognizes the mathematical practices in the rural and remote communities, also documented by research in mathematics education conducted in collaboration with these communities (see, e.g., the sophisticated large-scale spatial representations of the peoples in the northwestern Kimberley region discussed in [7]).

More generally, through a diversified collection of Topic Study Groups (TSGs) in ICMEs, ICMI work aligns itself with the humanizing mission of the mathematics that is taught for the inclu-

sion of all learners. As a regular participant of TSGs on aspects of mathematics education and language, for example, I am impressed by how much attention several international colleagues pay to the linguistic use of the passive voice and nominalized forms in classroom teaching practices [9]. Human agency is very differently constructed in $(x + y) \cdot (x - y)$ *is easily seen to be equivalent to* $x^2 - y^2$, compared to *We can easily see the equivalence between* $(x + y) \cdot (x - y)$ *and* $x^2 - y^2$. As discussed in other TSGs with a focus on aspects of argumentation, human agency is also very differently constructed if mathematics teaching is aimed at designing and creating a strong inquiry-oriented environment for the promotion of all learners' mathematical reasoning and positive identities as problem thinkers [4]. This humanizing mission also crosses the diversified collection of ICMI Studies.

Second line of evidence

The ICMI Studies[5] constitute a major ICMI program with significant influence on the field of mathematics education. The very last ICMI Study launched in 2023 is "Mathematics Education and the Socio-Ecological," with Kate le Roux, University of Cape Town, South Africa, and Alf Coles, University of Bristol, UK, as co-chairs. The Discussion Document of the ICMI Study 27 is already finalized and disseminated internationally in 2024, alongside the call for the Study Conference in Quezon City, Philippines in January 2025, all this aiming at the final production of the Study Volume.[6] Moreover, we have available the pre-conference proceedings of the preparatory ICMI Symposium on Mathematics Education and the Socio-Ecological,[7] held online on 20 March 2023. As written in the September 2023 ICMI Newsletter [6], this ICMI Study will highlight three aims:

(1) *to gather state-of-the-art scholarship in socio-ecological mathematics education around the world and to engage in across-perspective dialogues;*
(2) *to explore the different ways in which a theorization of the socio-ecological influences the focus and methodological approaches of mathematics education research; and*
(3) *to provide insight into the practical implications of socio-ecological research associated with the mathematics curriculum, pedagogy, teacher preparation and education-related policies, beyond traditional approaches.*

[3] https://icme15.org/icme-15-scientific-program/discussion-groups
[4] https://icme15.org/first-nations-australians

[5] https://www.mathunion.org/icmi/activities/icmi-studies-activities
[6] https://www.mathunion.org/icmi/activities/icmi-studies/ongoing-icmi-studies
[7] https://www.mathunion.org/fileadmin/ICMI/Conferences/Socio%20Ecological/Porceedings-ICMI-symposium-20th-march-2023.pdf

The meaning of the phrases socio-ecological and socio-ecology in relation to mathematics education is not trivial. In a conference talk, Coles referred to the relevance of ecological and socio-political issues for the mathematics education practices, and to the responsibility of mathematics teaching and education in response to the ecological and socio-political needs of our world. The extract below is from the written version of the talk, at the 46th Conference of the International Group for the Psychology of Mathematics Education (IGPME), one of the several ICMI Affiliate Organizations. Mathematics education for global sustainability was precisely the theme of the conference.

> The phrase "socio-ecology" points to the need for combining socio-political and ecological concerns. In this plenary talk, I consider what the socio-ecological means for mathematics education and what responsibility mathematics education has towards the socio-ecological. I review my own past research on "what" we teach and "how" we teach it, in relation to socio-ecological concerns and propose eight themes. These themes include: questioning what gets centred in our work; moving towards a communal mathematics; engaging in a dialogic ethics; working against the epistemological "error" of focusing on the individual as the unit of learning. [2, p. 17]

Although the 27th ICMI Study is explicitly underpinned by a humanizing mission of mathematics and mathematics education, it is not the only ICMI Study with such a view. Gender and Mathematics Education (ICMI Study 7) and Educational Interfaces between Mathematics and Industry (ICMI Study 20) are just two examples. ICMI is funding the open access publication of the volumes of its ICMI Studies and, in this way, making their content progressively available to anyone all over the world,[8] which is again a proof of the commitment to global service and scholarship. How funds are used is certainly important and informative. Since ICME-8, the ICMEs Solidarity Fund provides grants to people from less affluent regions of the world to support more diverse participation in the congresses.

Third line of evidence

The ICMI Awards[9] pay tribute to outstanding scholarship and achievement in mathematics education. All awardees represent together the broad range of endeavors and emphases that characterize mathematics education research and practice. In the history of the ICMI Awards, two mathematics education researchers have particularly been selected for their contributions and ideas regarding mathematical and mathematics education practices for bringing dignified human dimensions into relations between individuals, societies and cultures. Professor Ubiratan D'Ambrosio, from Brazil, was honored with the 2005 Felix Klein Award. "Socio-cultural bases for mathematical education" was the title of his pioneering talk at ICME-5 in 1984, in which he discussed critical meanings of mathematics for all and the place of mathematics education in societies [3]. The citation published for the ICMI distinction indicates the role of D'Ambrosio:

> In the development of research perspectives which are sensitive to the characteristics of social, cultural, and historical contexts in which the teaching and learning of mathematics take place, as well as his insistence on providing quality mathematics education to all, not just to a privileged segment of society.[10]

Ten years later, Professor Alan Bishop, from UK and Australia, was honored with the 2015 Felix Klein Award. Bishop's work puts at the center the discussion of whether and how values interact with mathematics teaching and learning. Not only is his book titled "Mathematical Enculturation: A Cultural Perspective on Mathematics Education" [1] a milestone in the field, but he was also a founder of the Mathematics Education and Society (MES) community,[11] which gave rise to the associated conferences on the political and social dimensions of mathematics education. At ICME-6 in 1988, Bishop co-organized a special one-day event that would lead to create the MES community. The citation published for this distinction indicates Bishop's ground-breaking contributions to:

> The notion of mathematics as a cultural product and the cultural values that mathematics embodies … bringing the political, social, and cultural dimensions of mathematics education to the attention of the field. … "Alan is an excellent scholar and researcher who has shaped our field not only over his lifetime but also over its lifetime…"[12]

It is of course unfair not to mention many other, if not all, ICMI medalists throughout these decades. My conversations with Celia Hoyles, for example, during her 2023 stay in Barcelona for the preparation of the last module of her ICMI AMOR Unit (read about AMOR in [8]) showed her genuine interest in the mathematical learning and strengths of all groups of learners, alongside

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[8] https://www.springer.com/series/6351/books

[9] https://www.mathunion.org/icmi/awards/icmi-awards

[10] https://www.mathunion.org/icmi/awards/past-receipients/2005-felix-klein-award

[11] https://www.mescommunity.info

[12] https://www.mathunion.org/icmi/awards/past-receipients/2015-felix-klein-award

a genuine enthusiasm and trust in the generous vision of teams of mathematics educators and teachers across the world.

Fourth line of evidence

The Capacity and Network Project (CANP)[13] is one more expression of the humanizing mission of ICMI. CANP has been a major investment of ICMI in the last decade, devoted to enhancing mathematics education at all levels in the so-called developing countries and regions so that their people are capable of meeting challenges of mathematics teaching and learning, teacher education, and professional development. The process of this ICMI project, starting in 2011, is a journey of teamwork and change involving series of programs towards the common goal of making high quality mathematics education available to all, including the people of low-income and lower-middle-income countries in five world regions shortly named as CANPs: Sub-Saharan Africa, East Africa, Central America and the Caribbean, South-East Asia, and Andean Region and Paraguay. Each CANP has a loosely structured governance mechanism supported by at least two regional representatives and one member from the ICMI Executive Committee, who serves as a liaison and principal contact.

CANP has proven successful and vibrant regional communities are emerging out of this process. As explained by the vice-president of ICMI who currently provides the general coordination of all the CANPs, Anjum Halai, there are also many challenges and future directions to be explored in the coming period:

> The community of mathematics educators across the five CANPs is a significant resource because working at the grassroots level they provide insights into key issues and challenges in promoting mathematics education. … CANP could support the local efforts to become part of the wider international mathematics education community by helping local activity aspire to international standards of quality, and by supporting international dissemination findings. [5, p. 45].

One more dimension of the ICMI work is therefore concerned with the inequalities in development between developed and developing regions. This is another important and informative way of how the funds of ICMI are used for the benefit of its humanizing mission. The CANP regional communities are collaboratively managed or guided by different professionals of mathematics education and mathematics such as school teachers, university researchers, teacher educators and representatives of educational authorities. These communities are free to make decisions and take actions within their local contexts that support the development and sustainability of the educational capacity of those responsible for mathematics education. Far from devaluing the complexity and diversity of each region by importing mainstream approaches, the CANP project is highly respectful with the knowledge, ideas and experiences of the people in the community.

Final remark

I could not include as many lines of evidence as I would have wished for my argument on the relationship between 'mathematics education' and 'humanity' in the work of ICMI, in this brief text. I apologize because I have inevitably overlooked ICMI initiatives and mathematics educators. Regardless, I encourage you to join some of the ICMI initiatives around mathematics education for humanity by participating in ICME-15 and by contributing to the ICMI Study 27. You can also enjoy and learn from watching the Introductory Module of the ICMI AMOR Unit devoted to Ubiratan D'Ambrosio.[14] Humanity and humility have the same linguistic root, as Ubiratan D'Ambrosio used to remind us. This closeness may be helpful for adopting the Copernican-type principle that all humans deserve the same privileged position in the universe of mathematics education!

References

[1] A. J. Bishop, *Mathematical enculturation: A cultural perspective on mathematics education*. Kluwer, Dordrecht (1988)

[2] A. Coles, Teaching in the new climatic regime: Steps to a socio-ecology of mathematics education. In *Proceedings of the 46th Conference of the International Group for the Psychology of Mathematics Education*, Vol. 1, pp. 17–33, University of Haifa, Israel (2023)

[3] U. D'Ambrosio, Socio-cultural bases for mathematical education. In *Proceedings of the Fifth International Congress on Mathematical Education*, pp. 1–6, Birkhäuser, Boston, MA (1985)

[4] T. Dreyfus, The interplay between construction of knowledge by individuals and collective mathematical progress in inquiry-oriented classrooms. In *Proceedings of the 14th International Congress on Mathematical Education*, Vol. I, 7 pp., World Scientific, Singapore, Shanghai (2024)

[5] A. Halai, ICMI column: Professional learning networks in mathematics education. *Eur. Math. Soc. Mag.* **129**, 44–46 (2023)

[6] F. Leung, Launching the 27th ICMI Study on Mathematics Education and the Socio-Ecological. *ICMI Newsletter*, September (2023)[15]

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[13] https://www.mathunion.org/icmi/activities/developing-countries-support-and-canp/capacity-networking-project-canp

[14] https://www.mathunion.org/icmi/awards/amor/ubiratan-dambrosio-unit
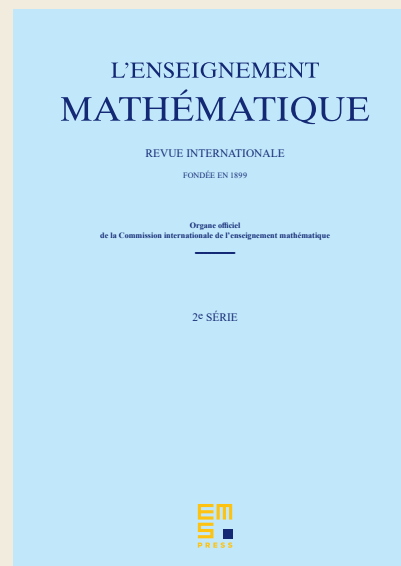[15] https://www.mathunion.org/icmi/icmi-newsletter-september-2023#on-page-9

[7] T. Lowrie, R. Jorgensen, T. Logan and D. Harris, Culture and geography: How do primary students map their local environment? *The Australian Educational Researcher* **49**, 261–284 (2022)

[8] N. Planas, ICMI AMOR: A collective long-term project with short-term opportunities. *Eur. Math. Soc. Mag.* **124**, 57–56 (2022)

[9] N. Planas, Arguments or findings regarding language as resource for mathematics learning and teaching. In *Proceedings of the 14th International Congress on Mathematical Education*, Vol. II, 16 pp., World Scientific, Singapore, Shanghai (2024)

[10] Ch. Rousseau, Editorial. *IMU-Net* **47**, May (2011)[16]

[11] Ch. Sorger, Proclamation of the 2024–2033 International Decade of Sciences for Sustainable Development by the UN General Assembly. *IMU News* **121**, September (2023)[17]

[12] United Nations General Assembly, *Universal declaration of human rights*. UN (1948)[18]

[13] United Nations General Assembly, *International decade of sciences for sustainable development, 2024–2033*. UN (2023)[19]

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[16] https://www.mathunion.org/imu-net/archive/2011/imu-net-047

[17] https://www.mathunion.org/imu-news/archive/2023/imu-news-121-september-2023#on-page-4

[18] https://digitallibrary.un.org/record/666853

[19] https://digitallibrary.un.org/record/4019134