



EDITORIAL

2025 Annual Summary of and Commentary on Publications in the Journal of Research in Science, Mathematics and Technology Education

Gerald Tembrevilla & G. Michael Bowen

Mount Saint Vincent University, CANADA

Please note that the APA references are available at the article.

Here is our 2025 Annual Summary of Publications in JRSMTE. We tried synthesizing all publications for this year by volume and issue, with an overall look at the emerging themes.

In Volume 8, Issue 3 (September 2025), we find that three themes stand out. One is on equity-oriented and culturally responsive EdTech integration, foregrounding how “intentional” technology use must be aligned with inclusive and culturally relevant pedagogy (Gomez). Second is on evidence-informed science learning through hands-on/practical work, consolidating what practical work contributes to secondary learners via meta-analytic synthesis (Sanjito & Hyams-Ssekasi). Third is on student perceptions, motivation, and trust in science, emphasizing how learners’ engagement and views about tentativeness/trust shape participation in science learning experiences (Nyutu et al.).

In Volume 8, Issue SI (June 2025 Special Issue), we also find that the special issue clusters around three themes. One is on STEM/STEAM pedagogy design and evaluation, ranging from inquiry-based teaching preferences (Goldberg & Darwin) and logic instruction (Benardini & Manghi) to game-based learning (Jonas & Ogodo) frameworks and transdisciplinary STEAM approaches (e.g., inquiry, logic, GBL, 5E/STEAM) (Mansouri). Another is on identity, equity, and belonging in mathematics and science pathways, highlighting self-efficacy, gender and values negotiations, instructors of color, science identity, and racially marginalized students within assessment and learning structures (Darwin & Pinheiro; Fogelman et al., Wambua). The third is on assessment and learning quality in authentic contexts, including criteria-based tools for chemistry explanatory videos (Merk et al.), collaborative/group testing (Dinglasan & Weible), authentic assessment in STEM programs (Marsh et al.), perceptions of calculus exams/test anxiety (Kenyon & Benson), and how representations (e.g., LEGO details) and prior domain knowledge influence mathematical reasoning (Tellos & Osana).

In Volume 8, Issue 2 (2025), we observe that three coherent themes also emerge. One is on socioscientific reasoning and civic-facing STEM learning, exemplified by photovoice as an action-oriented method to deepen preservice

teachers' socioscientific reasoning (Liu & Buck). Second is on equity and knowledge pluralism in STEM professional learning, particularly through systematic review evidence on integrating Indigenous Knowledge Systems in STEM PD (Shive). Third is on the human factors of learning with technology and conceptual difficulty in mathematics, spanning technostress/productivity in higher education (Deimeke et al.) and persistent misconceptions in calculus modelling/optimization (Machaba et al.), with a complementary focus on teacher wellbeing and induction as a condition for sustained STEM teaching quality (Luft).

Lastly, in Volume 8, Issue 1 (2025), we think three common themes also surfaced. One is on technology adoption gaps in classroom practice, contrasting teachers' perceptions versus actual ICT use in mathematics teaching (Dogbey & Kpadin). Another is on curriculum materials, task design, and learning progressions as levers for conceptual understanding, reflected in textbook comparisons (Canada–Japan) (Golafshani) and iterative design cycles supporting covariational reasoning (Paoletti et al.). The third is on scalable learning supports and knowledge mobilization, seen in evaluation-driven supplementary YouTube video lessons (Insorio & Manalo) and the editorial framing that positions JRSMTTE's leadership and archival reflection as part of a broader research-to-practice agenda (Bowen & Tembrevilla).

Overall, we attempted to create a cross-issue synthesis connecting with STEAM education and the emerging GenAI. Taken together, Volume 8 (2025) shows a converging agenda on (a) equitable participation and identity-sustaining learning, (b) high-quality design of learning experiences (tasks, representations, practical work, game-based and transdisciplinary STEAM activities), and (c) robust assessment and evidence practices (meta-analysis, systematic review, mixed methods, phenomenography, and instrument development). We argue that these emphases map directly onto emerging STEAM research that treats STEAM as transdisciplinary problem-framing, authentic assessment, and culturally grounded participation.

In that landscape, we believe GenAI becomes valuable when positioned as a design-and-equity tool, one on supporting teachers' intentional differentiation (while auditing bias and access) or accelerating iterative task/design cycles (e.g., generating, critiquing, and refining representations/prompts aligned to learning progressions), and probably even on strengthening assessment ecosystems (e.g., rubric co-design, feedback quality checks, and multimodal explanation support) without replacing disciplinary reasoning. Our overarching argument is that the throughline from our 2025 issues is a clear caution and opportunity, that is, GenAI can amplify learning and productivity, but we at JRSMTTE insist on continuing to be consistent with our commitments on equity, identity, authentic assessment, and principled pedagogy, which remain the non-negotiable “guardrails” for adoption and research.

Volume 8, Issue 3 (2025)

1. Commentary Piece: There is no a Silver Bullet – Intentional Equity-Focused Technology Integration in Schools

Authors: Kimberley Gomez

Keywords: Equity-focused technology integration, culturally relevant pedagogy, inclusive pedagogy, computer-supported collaborative learning

DOI: <https://doi.org/10.31756/jrsmte.831>

2. **The Impact of Science Practical Work on Secondary School Students' Learning Outcomes: A Meta-Analysis**

Authors: Baraka Peter Sanjito, Denis Hyams-Ssekasi

Keywords: Meta-analysis, Science Practical Work, Student Learning Outcomes, Secondary Education, Experimental Learning

DOI: <https://doi.org/10.31756/jrsmte.832>

3. **Perceptions of Science amongst College Students: An Exploration of Tentativeness and Trust**

Authors: Eva N. Nyutu, Bill Cobern, Mina Maleki, Gregory Grabowski, Michelle Andrzejak

Keywords: Learning motivation; Active learning; Experiential learning; Student engagement; Perceptions

DOI: <https://doi.org/10.31756/jrsmte.833>

Volume 8, Issue SI, June 2025 - 4th Special Issue (JRSMTE Graduate Research)

1. **The Right Answer for the Wrong Reason: Preservice Science and Mathematics Teacher Preferences and Explanations of Inquiry-Based Teaching**

Authors: Elizabeth R Goldberg, Taylor Darwin

Keywords: preservice math and science teachers, inquiry-based teaching; misconceptions, student-centered instruction

DOI: <https://doi.org/10.31756/jrsmte.411SI>

2. **High School Students' Knowledge and Risk Perceptions of Climate Change: The Role of an Elective Environmental Science Course**

Authors: Osman Aksit

Keywords: Climate Change Education, Environmental Science, Risk Perception, Secondary Students

DOI: <https://doi.org/10.31756/jrsmte.412SI>

3. **Voices of Support: Community College Instructors of Color Reflections on Fostering Self-Efficacy in Corequisite Mathematics Students**

Authors: Taylor Darwin, Weverton Ataide Pinheiro

Keywords: mathematics education, self-efficacy, instructors of color, identity, corequisite mathematics

DOI: <https://doi.org/10.31756/jrsmte.413SI>

4. **Prioritizing Expectations Through Professional Development on Mentorship for Physics Undergraduate Research**
Authors: Heather McCall, Cameron Richards, Jennifer Wilhelm, Christopher Crawford
Keywords: Research Experience for Undergraduates (REU), Professional Development (PD), Mentoring Practices, Mixed-Methods
DOI: <https://doi.org/10.31756/jrsmte.414SI>

5. **Eighth-Grade Students' Conceptions of Substitution in Everyday Life: A Phenomenography**
Authors: Manasseh Cudjoe, Jazlin Ebenezer, Joseph Ofori-Dankwa
Keywords: Substitution, Everyday Mathematics, Phenomenography, Middle School Mathematics
DOI: <https://doi.org/10.31756/jrsmte.416SI>

6. **Exploring Factors Influencing the Acceptance of Dry Lab Technologies in Ghanaian Senior High Schools: IPMA insights on the influence of Technology Familiarity**
Authors: Andrews Yirenkyi Kwame Agyemang, Theophilus Aquinas Ossei-Anto, Akwasi Acheampong
Keywords: Dry lab, Technology acceptance, Practical chemistry
DOI: <https://doi.org/10.31756/jrsmte.415SI>

7. **A Criteria-based Assessment Instrument to Assess the Quality of Explanatory Videos in Chemistry Education**
Authors: Sarah Merk, Dominik Diermann, Katharina Forster, Jenna Koenen
Keywords: Explanatory videos, Chemistry lessons, Assessment instrument, Quality assessment
DOI: <https://doi.org/10.31756/jrsmte.417SI>

8. **A Curriculum Evaluation of a Genetics Unit from a Science Identity Perspective**
Authors: Sarah E. Fogelman, Maria A. Moreno Vera, Katherine L. McNeill
Keywords: Science Identity, Science Education, Science Curriculum
DOI: <https://doi.org/10.31756/jrsmte.419SI>

9. **Watch Those Studs! How Prior Domain Knowledge and Extraneous Details on LEGO® Bricks Influence Children's Fraction Division**
Authors: Alison Tellos, Helena P. Osana
Keywords: Extraneous details, Fraction division, Prior domain knowledge, Visual representations
DOI: <https://doi.org/10.31756/jrsmte.4110SI>

10. **K-8 Pre-Service Teachers' Technology Integration in Mathematics: Perspectives and Anticipated Practices**

Authors: Monte Meyerink, Fenqjen Luo

Keywords: Pre-Service Teacher, Perspectives, PICRAT, SAMR, Technology Integration

DOI: <https://doi.org/10.31756/jrsmte.4112SI>

11. Do STEM Programs Provide Authentic Assessments? Exploring Their Prevalence and Opportunities for Growth

Authors: Aradaryn Marsh; Althea Hotaling Hagan; Lisa Benson

Keywords: Authentic Assessment, Higher Education, Inclusive Learning, Racially Marginalized Students

DOI: <https://doi.org/10.31756/jrsmte.4111SI>

12. Framework as a Process: A User-Centric Conceptual Framework for Game-Based Learning

Authors: Joshua Jonas; Justina Ogo

Keywords: Cognitive Factors, Educational Games, Engagement Strategies, Game-Based Learning, User-Centric Design

DOI: <https://doi.org/10.31756/jrsmte.4114SI>

13. Knight or Knave? Description and Evaluation of a Programme for the Introduction of Logic at Primary School

Authors: Luigi Bernardi, Riccardo Manghi

Keywords: Knights and knaves, Logic, Mathematics education, Primary school, Semiotic

DOI: <https://doi.org/10.31756/jrsmte.418SI>

14. Examining the Connections between Students' General Perceptions of Mathematics and their Affiliations with Specific Lesson Segments

Authors: Michelle M. Wambua

Keywords: Lesson Segments, Identity narratives, School Mathematics

DOI: <https://doi.org/10.31756/jrsmte.4116SI>

15. Higher Education STEM Faculty Views on Collaborative Assessment and Group Testing

Authors: Allan Jay Dinglasan; Jennifer Lynn Weible

Keywords: Collaborative assessment, faculty perceptions, group testing, higher education, pedagogy reform, STEM education

DOI: <https://doi.org/10.31756/jrsmte.4113SI>

16. Fostering the Development of Young Students' Analytical Thinking by use of a Problem-solving Method

Authors: Lavinia Suvi Lanting

Keywords: Analytical thinking, mathematics teaching, Polya's method, problem solving, reflection as a learning method

DOI: <https://doi.org/10.31756/jrsmte.4117SI>

17. Assessing What We Value: Engineering Students' Perceptions of Calculus Exams and Connections to their Future in Engineering

Authors: Catherine M. Kenyon; Lisa C. Benson

Keywords: Calculus assessment, first-year engineering, math test anxiety, future time orientation, interpretative phenomenological analysis

DOI: <https://doi.org/10.31756/jrsmte.4118SI>

18. Women-Identifying Graduate Students' Values of Mathematics Teaching and Learning: Illuminating Sites of Negotiation and Affirmation

Authors: T. Royce Olarte, Ciera Street

Keywords: Graduate Students, Gender; Values, Equity, Postsecondary Education

DOI: <https://doi.org/10.31756/jrsmte.4119SI>

19. Bridging Art and Science: Engaging Girls in the Physics of Sound Through a Transdisciplinary STEAM Approach

Authors: Narges Mansouri

Keywords: 5E instructional model, Female students, Focused ethnography, Transdisciplinary STEAM

DOI: <https://doi.org/10.31756/jrsmte.4120SI>

Volume 8, Issue 2, 2025

1. Using Photovoice to Promote Preservice Teachers' Socioscientific Reasoning Skills

Authors: Conghui Liu, Gayle Buck

Keywords: Socioscientific issues, Socioscientific reasoning, photovoice, preservice teachers, action research.

DOI: <https://doi.org/10.31756/jrsmte.821>

2. Equitable Integration of Indigenous Knowledge System in STEM Education Professional Development: A systematic review

Authors: Elyssa Milette Cherry Shive

Keywords: STEM Education, Indigenous Knowledge Systems, Professional Development, Equity.

DOI: <https://doi.org/10.31756/jrsmte.822>

3. **Course Technology & First-year Undergraduates at an HBCU: Technostress, Role Stress, & Productivity**
Authors: Elizabeth Deimeke, Therese Pigott, Reneé Schwartz
Keywords: retention, course technology, technostress, role stress, productivity
DOI: <https://doi.org/10.31756/jrsmte.823>

4. **Grade 12 Students' Misconceptions when Modelling their Calculus Ideas into their Learning of an Optimisation: A Real-Life Problem**
Authors: M.F Machaba, G Jameson, Vojo George Fasinu
Keywords: calculus, misconception, Grade 12, modelling, optimisation
DOI: <https://doi.org/10.31756/jrsmte.824>

5. **Commentary Piece: Supporting and Ensuring the Well-Being of Early Career Science Teachers**
Authors: Julie A. Luft
Keywords: Teacher Induction, STEM, Early Career Success
DOI: <https://doi.org/10.31756/jrsmte.825>

Volume 8, Issue 1, 2025

1. **The Perceptions versus Usage of Information and Communication Technology Tools Among High School Mathematics Teachers in The Northern Region of Ghana**
Authors: James Dogbey, Hannah Nayempuan Kpadin
Keywords: ICTs, Perceptions, Senior High School Mathematics Teachers, Mathematics Education, Ghana
DOI: <https://doi.org/10.31756/jrsmte.811>

2. **Comparative Analysis of Content, Organization, and Presentation of Mathematical Concepts in Canadian and Japanese Grade Fifth Textbooks**
Authors: Nahid Golafshani
Keywords: Textbooks, Mathematics, Memorization, Content Comparison, Conceptual Understanding
DOI: <https://doi.org/10.31756/jrsmte.812>

3. **Refining Progressions and Tasks: A Case Study of Design Cycles to Support Covariational Reasoning**
Authors: Teo Paoletti, Allison L. Gantt, Madhavi Vishnubhotla, Steven Greenstein
Keywords: Local Instruction Theory, Hypothetical Learning Trajectory, Teaching Experiments, Task Design, Covariational Reasoning
DOI: <https://doi.org/10.31756/jrsmte.813>

4. **Mathematics Teachers' and Students' Learning Evaluation for National Learning Camp: Basis for Supplementary YouTube Video Lessons**

Authors: Jorelyn Estrellado Insorio, Deseree Castillo Manalo

Keywords: Evaluation, Learning Camp, Mathematics, Video Lessons

DOI: <https://doi.org/10.31756/jrsmte.814>

5. **Editorial - Building on a Legacy: The Future of JRSMTE Under New Leadership**

Authors: G. Michael Bowen, Gerald Tembrevilla

DOI: <https://doi.org/10.31756/jrsmte.815>

6. **2024 Annual Summary of the Journal of Research in Science, Mathematics and Technology Education (JRSMTE)**

Authors: G. Michael Bowen, Gerald Tembrevilla
