



REVIEW ARTICLE

HUMANIZING MATHEMATICS: FOSTERING VALUES IN SECONDARY SCHOOL STUDENTS

Karanam Mahaboob Vali

Department of Education, Aligarh Muslim University Centre, Murshidabad, West Bengal, India.

*Corresponding Author Email: dkmvali@myamu.ac.in

This is an open access journal distributed under the Creative Commons Attribution License CC BY 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited

ARTICLE DETAILS

Article History:

Received 14 August 2025
Revised 23 September 2025
Accepted 28 October 2025
Available online 29 November 2025

ABSTRACT

Mathematics education has long been a subject of debate, with many students struggling to find meaning and engagement in the subject. However, a growing body of research suggests that incorporating humanistic values and practices into teaching mathematics can profoundly impact student motivation and learning. Integrating values in mathematics education is essential for fostering a holistic learning environment that prepares secondary school students for academic success and responsible citizenship. This paper explores "humanizing mathematics," emphasizing the importance of teaching mathematics as a socially relevant and ethically grounded discipline. By examining various pedagogical approaches, including critical mathematics education and culturally responsive teaching, the study highlights how these methods can cultivate values such as equity, respect, and critical thinking among students. Through a review of existing literature and case studies, the paper identifies effective strategies for educators to implement in the classroom, such as collaborative learning, real-world problem-solving, and the incorporation of diverse cultural perspectives in mathematical content. Ultimately, this research underscores the necessity of rethinking mathematics education to prioritize humanistic values, equipping students with the skills and ethical frameworks needed to navigate an increasingly complex world.

KEYWORDS

Critical thinking, collaborative learning integration, fostering a holistic learning, pedagogical approaches.

1. INTRODUCTION

Research indicates that students' enjoyment and engagement with mathematics begin to wane as they progress through the middle and secondary grades (Matteson et al., 2011). This decline in motivation can have far-reaching consequences for students' academic performance and their overall well-being and future prospects. By incorporating humanistic values into mathematics teaching, educators can help students rediscover the inherent beauty and relevance of the subject, ultimately leading to improved learning outcomes and a more positive relationship with mathematics.

Historically, mathematics is deeply rooted in culture through symbols, operational processes, and representations in arts, crafts, and literature (Barton et al., 2006). Therefore, mathematics is inseparable from culture and the evolution of cultures. In this sense, there is no difference between using and doing mathematics. Learning mathematics seems to be influenced by learners' cultural background and how they connect mathematics to day-to-day life through games, plays, and artefacts (Acharya, 2015; Pradhan, 2017). Therefore, mathematics should enable learners to perform mathematics operations in their cultural milieu (Acharya, 2020).

Mathematics, often perceived as an abstract and rigid discipline, has the power to shape young minds and foster essential human values. As secondary school students navigate the complexities of adolescence, mathematics education can play a pivotal role in developing their critical thinking, problem-solving, and emotional intelligence. However,

traditional math instruction often prioritizes procedural fluency over conceptual understanding, leaving students disengaged and disconnected from the subject's broader implications.

Humanizing mathematics involves recognizing its capacity to cultivate values such as:

- Curiosity and inquiry
- Creativity and imagination
- Critical thinking and problem-solving
- Persistence and resilience
- Collaboration and communication
- Empathy and social responsibility

2. LOGICAL REASONING AND ANALYTICAL THINKING

By integrating these values into mathematics education, we can create a more inclusive, relevant, and transformative learning experience for secondary school students. This approach not only enhances students' math proficiency but also prepares them for success in an increasingly complex, interconnected world. The National Education Policy (NEP) 2020 emphasizes the importance of holistic education, focusing on the development of students' cognitive, emotional, and social abilities. Humanizing mathematics aligns with this vision, recognizing that:

- Math education should prioritize student-centred learning.
- Values and attitudes are essential outcomes of math education.

Quick Response Code



Access this article online

Website:
www.educationsustainability.com

DOI:
10.26480/ess.02.2025.53.56

- Real-world applications and contexts enhance math learning.
- Technology can facilitate innovative math instruction.

2.1 Objectives

- Identify key values to be fostered through math education.
- Examine innovative teaching approaches and resources.
- Discuss assessment methods that prioritize value-based learning.
- Investigate the impact of humanized math education on student outcomes.
- Reflections and Perspectives of Humanizing Mathematics Education

3. IMPORTANCE OF HUMANIZING MATHEMATICS

The humanization of mathematics education is a critical endeavor that seeks to transform the way mathematics is taught and perceived in secondary schools. This approach emphasizes the integration of values, ethics, and social responsibility into the mathematics curriculum. The importance of this initiative can be understood through several key dimensions:

3.1 Relevance to Real-World Issues

Humanizing mathematics connects mathematical concepts to real-world problems, making the subject more relevant and engaging for students. By addressing issues such as social justice, environmental sustainability, and economic inequality, students can see the practical applications of mathematics in their lives and communities. This relevance fosters a deeper understanding and appreciation of mathematics as a tool for problem-solving and critical thinking.

3.2 Development of Critical Thinking Skills

Integrating values into mathematics education encourages students to think critically about the implications of mathematical decisions and solutions. It promotes inquiry-based learning, where students are encouraged to ask questions, analyze data, and evaluate the consequences of their mathematical reasoning. This critical engagement helps students develop essential skills that are applicable beyond the classroom, preparing them for complex decision-making in their personal and professional lives.

3.3 Fostering Ethical Reasoning

Incorporating ethical considerations into mathematics education helps students understand the moral implications of their work. It encourages them to consider questions of fairness, equity, and justice when applying mathematical concepts. By fostering ethical reasoning, students learn to approach problems with a sense of responsibility and integrity, which is crucial in an increasingly interconnected and diverse world.

3.4 Promoting Inclusivity and Diversity

Humanizing mathematics education emphasizes the importance of inclusivity and diversity in the learning environment. By recognizing and valuing different cultural perspectives and experiences, educators can create a more equitable classroom that respects and celebrates diversity. This approach not only enhances student engagement but also helps to dismantle stereotypes and biases associated with mathematics, encouraging all students to see themselves as capable mathematicians.

3.5 Enhancing Student Motivation and Engagement

When students perceive mathematics as a human-centred discipline that relates to their lives and values, their motivation and engagement levels increase. Humanizing mathematics fosters a sense of belonging and relevance, making students more likely to participate actively in their learning. Engaged students are more likely to pursue further studies in mathematics and related fields, contributing to a more diverse and skilled workforce in STEM areas.

3.6 Building Collaborative Skills

Humanizing mathematics often involves collaborative learning experiences, where students work together to solve problems and discuss mathematical concepts. This collaborative approach not only enhances mathematical understanding but also builds essential interpersonal skills such as communication, teamwork, and empathy. These skills are vital for success in both academic and professional settings.

3.7 Preparing Responsible Citizens

Ultimately, humanizing mathematics education prepares students to be responsible and informed citizens. By fostering values such as social responsibility, empathy, and ethical reasoning, students are equipped to engage with societal challenges and contribute positively to their communities. This preparation is essential in a world where mathematical literacy is increasingly important for informed decision-making in civic life.

4. CHARACTERISTICS OF HUMANIZING MATHEMATICS

Humanizing mathematics education involves a transformative approach that integrates values, ethics, and social responsibility into the teaching and learning of mathematics. This approach is characterized by several key features that distinguish it from traditional mathematics education. Below are the primary characteristics of humanizing mathematics:

4.1 Contextual Relevance

Humanizing mathematics emphasizes the importance of connecting mathematical concepts to real-world contexts. This involves using examples and problems that are relevant to students' lives, communities, and societal issues. By situating mathematics within meaningful contexts, students can see the applicability of mathematical skills and concepts, enhancing their engagement and understanding.

4.2 Culturally Responsive Pedagogy

A humanized approach to mathematics education recognizes and values the diverse cultural backgrounds of students. It incorporates culturally relevant materials and perspectives, allowing students to see their identities reflected in the curriculum. This responsiveness fosters a sense of belonging and encourages all students to participate actively in their learning.

4.3 Emphasis on Critical Thinking and Problem Solving

Humanizing mathematics encourages students to engage in critical thinking and problem-solving rather than rote memorization. Students are prompted to analyze, evaluate, and synthesize information, developing their ability to approach complex problems creatively. This characteristic promotes a deeper understanding of mathematical concepts and their implications.

4.4 Integration of Ethical Considerations

Ethics play a central role in humanizing mathematics. This approach encourages students to consider the moral implications of mathematical decisions and solutions. Discussions around fairness, equity, and social justice are integrated into the curriculum, helping students develop a sense of responsibility and ethical reasoning in their mathematical practices.

4.5 Collaborative Learning Environments

Humanizing mathematics fosters collaborative learning experiences where students work together to solve problems and share ideas. This collaborative approach not only enhances mathematical understanding but also builds essential social skills such as communication, teamwork, and empathy. Students learn to value diverse perspectives and work collectively towards common goals.

4.6 Focus on Student Agency and Voice

In a humanized mathematics classroom, students are encouraged to take ownership of their learning. This involves providing opportunities for students to express their ideas, ask questions, and contribute to discussions. By valuing student voice and agency, educators create an environment where students feel empowered and invested in their learning process.

4.7 Interdisciplinary Connections

Humanizing mathematics often involves making connections between mathematics and other disciplines, such as science, social studies, and the arts. This interdisciplinary approach helps students see the interconnectedness of knowledge and the relevance of mathematics in various fields. It also encourages holistic thinking and problem-solving.

4.8 Use of Technology and Innovative Tools

Incorporating technology and innovative tools is a characteristic of humanizing mathematics that enhances learning experiences. Digital resources, simulations, and interactive platforms can provide students

with engaging ways to explore mathematical concepts and collaborate with peers. Technology can also facilitate access to diverse perspectives and resources.

4.9 Reflective Practices

Humanizing mathematics encourages reflective practices among students and educators. Reflection allows students to consider their learning experiences, understand their thought processes, and evaluate their understanding of mathematical concepts. Educators also engage in reflective practices to assess their teaching methods and adapt to meet the needs of their students.

4.10 Commitment to Lifelong Learning

Finally, humanizing mathematics fosters a commitment to lifelong learning. By instilling values such as curiosity, resilience, and a growth mind-set, students are encouraged to view learning as an ongoing journey. This characteristic prepares them to adapt to new challenges and continue their mathematical exploration beyond the classroom.

5. KEY VALUES TO BE FOSTERED THROUGH MATH EDUCATION

5.1 Critical Thinking

Explanation: Math encourages students to analyse problems, identify patterns, and develop logical reasoning skills.

Importance: This value is essential for making informed decisions in everyday life and in various professional fields.

5.2 Problem-Solving Skills

Explanation: Math education teaches students how to approach complex problems systematically and find solutions.

Importance: These skills are transferable to real-world situations, enabling students to tackle challenges effectively.

5.3 Persistence and Resilience

Explanation: Math often involves trial and error, requiring students to persist through difficulties and learn from mistakes.

Importance: This fosters a growth mind-set, encouraging students to view challenges as opportunities for growth rather than obstacles.

5.4 Collaboration and Communication

Explanation: Group work in math classes promotes teamwork and the ability to communicate mathematical ideas clearly.

Importance: These skills are vital in both academic and professional settings, where collaboration is often necessary.

5.5 Creativity

Explanation: Math is not just about following rules; it also involves creative thinking to devise new methods and approaches to problems.

Importance: This value encourages innovation and the ability to think outside the box, which is crucial in many fields.

5.6 Attention to Detail

Explanation: Math requires precision and careful attention to detail, as small errors can lead to incorrect results.

Importance: This skill is important in various professions, particularly in fields like engineering, finance, and science.

5.7 Ethical Reasoning

Explanation: Understanding the implications of mathematical models and data can foster ethical considerations in decision-making.

Importance: This is increasingly relevant in a data-driven world, where ethical dilemmas often arise from statistical interpretations.

5.8 Numeracy and Financial Literacy

Explanation: Math education equips students with the skills to understand and manage financial information.

Importance: This is crucial for personal finance management, understanding loans, investments, and budgeting.

5.9 Confidence and Self-Efficacy

Explanation: Success in math can build a student's confidence in their abilities and encourage a positive self-image.

Importance: This confidence can extend beyond math, influencing overall academic performance and personal growth.

5.10 Cultural Awareness

Explanation: Math has a rich history across various cultures, and understanding this can foster appreciation for diversity.

Importance: This awareness can enhance students' global perspective and respect for different ways of thinking.

6. REFLECTIONS AND PERSPECTIVES OF HUMANIZING MATHEMATICS EDUCATION

In the ever-evolving landscape of education, the role of mathematics has long been a subject of intense scrutiny and debate. Traditionally, mathematics education has been perceived as a rigid, technical discipline, often disconnected from the broader human experience. However, a growing body of research and scholarship has called for a more humanistic approach to mathematics education, one that recognizes the inherent connections between mathematical concepts and the lived experiences of students (Golding, 2018; Greer and Mukhopadhyay, 2015).

One of the key drivers of this shift towards a more humanized mathematics education is the recognition that the traditional division of labour has dramatically changed, with mathematics playing an increasingly important role in various aspects of our lives (Borovik, 2016). As such, the purpose of mathematics education must extend beyond the mere acquisition of skills and knowledge and instead focus on empowering students to engage with mathematics in a meaningful and transformative way. The notion of "powerful knowledge" proposed by Young and Muller provides a compelling framework for rethinking the purpose of mathematics education (Golding, 2018). They argue that mathematics should be taught not merely as a set of techniques and procedures, but as a way of understanding the world and engaging with complex problems.

7. CONCLUSION

Humanizing mathematics education is essential for fostering engagement, values, and social responsibility among secondary school students. By integrating emotional, social, and contextual aspects into learning, educators make mathematics more relevant to students' lives and inspire them to continue their mathematical pursuits. This approach emphasizes the role of mathematics beyond computation, highlighting its application in addressing real-world challenges like inequality, sustainability, and technological advancement. Integrating humanistic ideas into math instruction fosters ethical reasoning, empathy, teamwork, and critical thinking. It fosters a welcoming atmosphere where students view mathematics as a vibrant and significant subject relevant to their personal and societal lives. By bridging the gap between abstract ideas and students' experiences, culturally relevant education and real-world applications inspire diverse learners and promote STEM involvement. Ultimately, humanising mathematics produces well-rounded people who are proficient in mathematics and ready to make valuable contributions to society as knowledgeable, caring citizens. This all-encompassing strategy guarantees that maths instruction fosters social and ethical awareness and intellectual development.

REFERENCES

- Acharya, B.R., 2020. Promoting Inclusive Mathematics Classroom Practices in the Schools of Nepal. *An Ethnographic Inquiry. International Journal of Research-Granthaalayah*, 8 (3). Pp. 223-237.
- Acharya, B.R., Kshetree, M.P., Khanal, B., Panthi, R.K., and Belbase, S., 2021. Mathematics Educators' Perspectives on Cultural Relevance of Basic Level Mathematics in Nepal. *Journal on Mathematics Education*, 12 (1). Pp. 17-48. <http://doi.org/10.22342/jme.12.1.12955.17-48>
- Barton, B., Poisard, C., and Domite, M.D.C., 2006. Cultural connections and mathematical manipulations. *For the Learning of Mathematics*, 26 (2), Pp. 21-24. <https://halshs.archives-ouvertes.fr/halshs-00856440>

- Borovik, A.V., 2016. Mathematics for makers and mathematics for users, in *Humanizing Mathematics and its Philosophy: Essays Celebrating the 90th Birthday of Reuben Hersh* (B.Sriraman ed.), Birkhauser, 201X.
- Golding, J., 2018. Mathematics education in the spotlight: Its purpose and some implications. *London Review of Education*, 16 (3), Pp. 460–473.
- Julia, L.H., and Wee, T.S., 2022. Student values and wellbeing in mathematics education: perspectives of Chinese primary students. *ZDM – Mathematics Education*, 55, Pp. 385–398. <https://doi.org/10.1007/s11858-022-01418-7>
- Katsap, A., 2002. Humanizing Mathematics: The Humanistic Impression in the Course for Mathematics Teaching. *Humanistic Mathematics Network Journal*, 26 (6), Pp. 12-19.
- Koskinen, R., and Pitkänemi, H., 2022. Meaningful Learning in Mathematics: A Research Synthesis of Teaching Approaches. *International Electronic Journal of Mathematics Education*, 17 (2), Pp. em0679. <https://doi.org/10.29333/iejme/11715>
- Matteson, M., Salamon, J., and Brewster, L., 2011. A Systematic Review of Research on Live Chat Service. *Reference and User Services Quarterly*, 51, Pp. 172-190. 10.5860/rusq.51n2.172.
- Monica, E.C., Ernest, K.D., and Wee, T.S., 2023. An exploration of Ghanaian students' valuing in mathematics: How does it evolve across school levels? *EURASIA Journal of Mathematics, Science and Technology Education*, 19 (10), Pp. 1-7. <https://doi.org/10.29333/ejmste/13542>
- Pradhan, J.B., 2017. Mathematical ideas in Chundara culture: Unfolding a Nepalese teaching and learning system. In M. Rosa, L. Shirley, M. E. Gavarrete & W. V. Alangui (Eds.), *Ethno mathematics and its diverse approaches for mathematics education*, (pp. 125–152). Springer.
- Swapna, M., and Brian, G., 2015. Cultural responsiveness and its role in humanizing mathematics education. CERME 9 - Ninth Congress of the European Society for Research in Mathematics Education, Charles University in Prague, Faculty of Education, ERME, Feb 2015, Prague, Czech Republic. pp.1624-1629. fffhal-01287918 https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Tarmizia, M.A.A., Tarmizib, R.A., and Mokhtarc, M.Z., 2010. Humanizing Mathematics Learning: Secondary Students Beliefs on Mathematics Teachers' Teaching Efficacy. *Procedia Social and Behavioral Sciences*, 8, Pp. 532–536. DOI: 10.1016/j.sbspro.2010.12.073
- Wee, T.S., 2019. Values in Mathematics Education: Its Conative Nature, and How It Can Be Developed. *J. Korean Soc. Math. Educ., Ser. D, Res. Math. Educ.*, 22 (2), Pp. 99-121. <http://doi.org/10.7468/jksmed.2019.22.2.99>

