Humanizing STEM: Integrating Humane Education and Biocentric Values

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Target Audience: This presentation will benefit educators, curriculum developers, and others interested in inclusive approaches to teaching that prioritize ethical and ecological awareness.

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Can science, technology, engineering, and mathematics (STEM) education be a powerful force for good, fueled by compassion and profound respect for all life? This presentation explores the transformative potential of integrating humane education and biocentrism into STEM curricula. This is particularly relevant to the MACAS symposium's focus on "curricular approaches integrating mathematics and sciences."

We will begin by examining current STEM education frameworks. Following that, we will showcase experiential learning initiatives and community-based projects designed to cultivate empathy, ethical awareness, and an understanding of our interconnectedness with the natural world. Our aim is to demonstrate how these approaches can equip students to be both innovative and ethically grounded problem-solvers. This analysis contributes to the ongoing discourse surrounding STEM education, particularly in an era where societies are grappling with ecological crises and social injustices. Education must transcend traditional subject boundaries to foster holistic understandings of our interconnected world, and we emphasize that ethics is a much-needed aspect of any STEM-related initiative or pedagogy (Duobliene & Vaitekaitis, 2021). Drawing from humane and biocentric approaches (Gatarek, 2018), we highlight their pedagogical implications and practical applications within STEM education.

Reis et al. (2018) critique current education systems for inadequately addressing youth engagement in the global consumer market and suggest a shift towards critical perspectives on the intersection of science, technology, society, and the environment. While some authors in this

book advocate for ethics of "caring" or "stewardship," and others call to "love the world," we question whether these terms are best suited for STEM education. "Love" can be diluted, while "stewardship" and "care" risk anthropocentric bias. Instead, we propose revisiting universal ethical principles that benefit all living beings (Pedersen, 2004). Critical pedagogy, understood as teaching and learning practices designed to develop students' critical consciousness about oppressive social conditions, holds transformative potential regarding views on animals. However, some scholars claim that critical pedagogy remains solidly anthropocentric, rendering it useless outside of exclusively human-centered interests (Bell & Russell, 2000; Cavalieri, 2008). A potential remedy lies in the total liberation pedagogy proposed by Khan and Humes (2009), which holistically approaches planetary sustainability, social justice, and animal advocacy.

In this presentation, after outlining the relationships between environmental education and anthropocentric vs. humane and biocentric education principles, we will analyze the language used in the recently reformed Ontario mathematics and science and technology curricula (Ontario Ministry of Education, 2020; 2022). While these public documents contain some promising changes, they exhibit vagueness regarding implementation (particularly in mathematics) and anthropocentric bias (within science and technology). Integrating humane education and biocentric approaches into classroom discourse and lesson plans would allow students to recognize the ethical implications of their choices and actions. The revised curricula should emphasize holistic, systems-based thinking, fostering a sense of responsibility for the planet humans share with other living beings.

Teaching humane education requires interweaving several dimensions into instruction: from personal to social and political, as well as from local to global, and it encourages making connections among these dimensions. Students learn accurate information about the world, including awareness of specific examples of social injustice and inequality, environmental degradation, and institutional animal abuse. Crucially, such examples must always be accompanied by positive solutions and models for framing these problems with positive outcomes.

Finally, we will offer practical strategies for educators. We advocate for interdisciplinary curriculum design that integrates humane education and biocentric perspectives, covering topics such as ecosystem dynamics and conservation ethics. As an example, we will present an

experiential learning project in partnership between Madonna University and the Detroit Zoological Society's Zoo. This project encourages students to employ both scientific and humanities perspectives to solve local problems. Educators in K-12 settings can use similar, smaller-scale projects with local community partners such as animal shelters, wildlife organizations, animal sanctuaries, and other community organizations.

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