



Commentaries in Urban Education

Cultivating Joy and Empowerment through Arts-Integrated STEM Education

Abstract

Amidst prevailing narratives of trauma and adversity that often overshadow the lives of Black and Brown girls, a powerful counternarrative is emerging that centers on the transformative force of joy. In the face of systemic oppression that seeks to limit their experiences and self-expression, we pivot the narrative toward joy as a potent catalyst for change and empowerment. Stepping onto the innovative canvas of the STEM From Dance organization, Black and Brown girls find an affirming haven for uncovering their innate joy. In a world where playfulness and exuberance are inherent yet routinely overlooked, this program elevates these qualities to prominence. Through arts-integrated STEM education, STEM From Dance creates a vibrant space where joy flourishes unreservedly. By intertwining STEM principles with the realm of artistic expression, a dynamic synergy unfolds, sparking self-expression, fostering curiosity, magnifying cultural

resonance, and igniting boundless creativity. This celebration of joy not only cultivates the future STEM workforce but also empowers these young learners to become architects of positive change, within their own communities and the broader society.

Keywords

STEM, joy, empowerment, dance

How to Cite

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In the realm of STEM education, fostering joy and empowerment among all students, particularly Black and Brown girls, is not just a pedagogical aim; it's an imperative for equity and inclusivity. For far too long, systemic barriers have hindered their access to quality education and stifled their innate curiosity and exuberance. As we delve into the landscape of STEM education, it becomes

evident that joy is not just a byproduct of learning; it's a catalyst for engagement, creativity, and empowerment. This paper explores the transformative potential of arts-integrated STEM education in cultivating joy and empowerment among Black and Brown girls, with a particular focus on the initiatives pioneered by STEM From Dance.

Black and Brown Girl Joy in STEM

In the context of STEM education, the importance of joy for Black and Brown girls is underscored by research highlighting the systemic barriers they face. Studies like the National Science Foundation's (2015) report on diversity in STEM underscore the disparities in representation for marginalized groups, including Black and Brown girls. These barriers not only inhibit academic achievement but also stifle the joy of learning and exploration essential for fostering interest and success in STEM fields.

Csikszentmihalyi's concept of "flow" has been extensively studied in educational psychology, demonstrating its correlation with heightened engagement, creativity, and intrinsic motivation among learners (Csikszentmihalyi, 1990). Research by Csikszentmihalyi and Nakamura (2010) further suggests that experiences of flow in educational settings are associated with positive affect, enhanced learning outcomes, and increased self-esteem. By integrating dance and other artistic forms into STEM education, programs like STEM From Dance provide opportunities for students to enter states of flow to foster joy, creativity, and empowerment in the learning process.

Moreover, the significance of joy as a form of resistance and resilience against oppression has been explored in critical race theory and cultural studies (hooks, 2003). Scholars like bell hooks have emphasized the liberatory potential of joy in reclaiming agency and identity in the face of systemic injustices. Through its emphasis on cultural traditions and artistic expression, STEM From Dance creates spaces where Black and Brown girls can assert their humanity, celebrate their heritage, and resist oppressive narratives. Research by Jenson and de Castell (2013) on the role of arts-based pedagogies in fostering critical consciousness and empowerment among marginalized youth further supports the transformative potential of programs like STEM From Dance in promoting joy and agency in STEM education for Black and Brown girls.

Integration of STEM and Dance

At STEM From Dance, our approach to integrating STEM and dance is multifaceted and deeply immersive. Through hands-on activities like designing LED-lit costumes, creating music using principles of computer science, and synchronizing dance performances with computer-programmed animations, participants engage with both STEM and dance in a dynamic and interconnected manner. This approach not only fosters creativity and innovation but also nurtures essential skills for the STEM pathway, such as innovative thinking, problem-solving, and computational thinking. By seamlessly blending STEM concepts with the art of dance, we provide our students with a unique and enriching learning experience that transcends traditional disciplinary boundaries.

A typical session at STEM From Dance is meticulously designed to provide participants with a comprehensive and holistic learning environment. The session begins with Community Time, where students build relationships and set the tone for the day ahead. This is followed by the Dance Lab and STEM Lab, where students receive instruction and practice time in dance genre groups and STEM skill groups, respectively. Expert Sessions are then incorporated to expand students' understanding of STEM fields and careers, while also offering them opportunities to envision themselves in these fields. Workshops provide structured work time for students to integrate new learning into their showcase routines, and the session concludes with a Wrap-Up, where the day's progress is summarized and reflected upon. This structured yet flexible approach ensures that students receive a well-rounded and engaging educational experience that seamlessly integrates both STEM and dance.

Research by Bang and Vossoughi (2016), Bell (2018), and Daniel and Lovatt (2015) supports the notion that arts integration in STEM education goes beyond mere coexistence: it embodies a true fusion where the inherent qualities of each discipline enhance the other. By grounding STEM in the practical and relatable aspects of everyday life through arts integration, we humanize STEM and make it more accessible and relevant to our students. This reciprocal relationship between STEM and the arts not only preserves the essence of STEM principles but also amplifies the creative facets of art, providing a pathway for young minds to engage with the subject in ways that resonate with their natural inclinations. Through our integrated approach, we aim to cultivate joy and empowerment in our students, inspiring them to pursue their passions and excel in both STEM and

dance.

Joy Through Culture

Infusing culture into education not only enhances the learning experience but also cultivates a sense of joy and empowerment among students. At STEM From Dance, we recognize the importance of cultural diversity within communities of color and actively incorporate it into our programs. By integrating various dance forms deeply rooted in the traditions of these communities, such as African tribal dance, lindy hop, tap, hip-hop, salsa, bachata, and meringue, we magnify cultural resonance and create a space where students feel a strong sense of belonging.

Research by Gay (2010) suggests that incorporating culturally relevant content into education promotes student engagement and achievement, as it allows students to see themselves reflected in the curriculum and learning environment. By embracing students' cultural backgrounds and integrating them into the educational experience, we create an entry point for students to access and connect with the learning material. This not only makes the STEM environment more inviting and comfortable but also empowers students to see themselves as capable and worthy participants in STEM fields.

Dance serves as a powerful medium through which cultural connections can be established and celebrated. It provides a familiar and accessible entry point for students to engage with STEM concepts, making the seemingly distant realm of STEM more relatable and attainable. As students explore STEM through the lens of dance and their cultural heritage, they develop a deeper understanding of the subject matter while also gaining a greater appreciation for their own cultural identity. This integration not only transforms STEM careers from seemingly unthinkable to entirely within reach but also instills a sense of pride and empowerment in students, reaffirming that STEM is indeed for everyone.

Joy Through Creativity

Providing students with opportunities for creative expression is integral to cultivating joy and empowerment in education. At STEM From Dance, we recognize the transformative power of creativity and actively encourage students

to explore their creative potential. By allowing students to create their own dance-tech performances, we empower them to take ownership of their learning experiences and express themselves authentically. Research by Runco (2014) suggests that fostering creativity in education not only enhances students' problem-solving skills but also promotes emotional well-being and a sense of fulfillment.

The act of creation instills a sense of empowerment in students, leading to a plethora of ideas and possibilities. By granting students the autonomy to shape their own performances, STEM From Dance instills a sense of trust and confidence in students, encouraging them to take creative risks and explore new avenues of expression. This freedom to experiment and innovate fosters self-expression and expands students' perceptions of their capabilities and potential. Sawyer (2012) demonstrates that encouraging creativity in education leads to greater engagement, motivation, and cognitive flexibility among students. Furthermore, playfulness plays a crucial role in fostering joy and curiosity in the learning process. By creating a low-pressure environment where students can tinker, experiment, and learn without the constraints of rigid expectations, STEM From Dance cultivates a sense of joy and wonder in students. This spirit of play helps students engage with STEM concepts in a fun and exploratory manner, leading to exciting discoveries and a deeper understanding of the subject matter. As students embark on their creative journey at STEM From Dance, they develop essential STEM skills while cultivating a lifelong passion for learning and innovation.

Joy Through Community

Creating a sense of community is essential for cultivating joy and empowerment in STEM education, particularly for girls of color who often face unique challenges and barriers. Research by Stanton-Salazar and Spina (2005) emphasizes the importance of belongingness and supportive relationships in educational settings, particularly for marginalized students. At STEM From Dance, we recognize the significance of fostering a supportive community where girls feel valued, respected, and empowered to pursue their STEM interests. By providing a space where girls can connect with peers and supportive adults who share similar experiences and aspirations, STEM From Dance creates a nurturing environment where girls can thrive.

In rigorous and demanding fields like STEM, having a supportive community can make all the difference in a girl's educational journey. Research by Hughes et al. (2018) highlights the positive impact of social support networks on academic achievement and well-being, particularly for underrepresented students in STEM fields. By fostering a sense of belonging and camaraderie among participants, STEM From Dance not only enhances girls' academic performance but also cultivates a sense of joy and fulfillment in their STEM endeavors.

Furthermore, our approach at STEM From Dance emphasizes the importance of co-designing classrooms and curricula with our students. By involving girls in decision-making processes and allowing them to shape their learning experiences, we empower them to take ownership of their education and outcomes. Cohen (1994) suggests that student-centered learning environments promote greater engagement and motivation among students, leading to enhanced learning outcomes. Through collaborative learning experiences and shared goals, participants in STEM From Dance develop a deep sense of connection, flow, and joy, enriching their overall educational experience and fostering a lifelong passion for STEM.

Case Study

Malika's journey with STEM From Dance is a testament to the transformative power of arts-integrated STEM education in cultivating joy, empowerment, and future success. Initially hesitant about coding, Malika's experience in our program challenged her perceptions and sparked a newfound passion for STEM. Through our summer program, Malika had the opportunity to create a costume with circuits to complement her choreography, a task that ignited her curiosity and creativity. Reflecting on her experience, Malika expressed, "Before STEM From Dance, I did not want to go into coding at all. The applications used in the program were really cool and relatable."

During the program, Malika and her group embarked on a project to synchronize LED suits with a light sequence that complemented their dance performance. This hands-on experience not only allowed Malika to explore the intersection of dance and technology but also provided her with a sense of empowerment as she learned to code and create something meaningful. Malika recalls, "STEM From Dance opened my eyes to the possibilities within STEM. It was amazing to

see how I could combine my love for dance with my newfound interest in coding.”

Furthermore, Malika’s participation in STEM From Dance fostered a sense of belonging and community, providing her with a supportive environment to explore her interests and pursue her aspirations. This sense of community, coupled with Malika’s new passion for coding, ultimately influenced her academic and career trajectory. Today, Malika is a graduate of Bates College with a degree in mathematics and is thriving as a data scientist. She attributes her success to her experience with STEM From Dance, stating, “It’s why I’m in the field that I’m in today and why I love coding!” Malika’s story exemplifies the profound impact of arts-integrated STEM education in empowering young women like her to pursue their dreams and excel in STEM fields.

Conclusion

This exploration into the intersection of joy, empowerment, and arts-integrated STEM education makes clear that the journey toward equity and inclusivity in STEM requires a multifaceted approach. By recognizing and celebrating the diverse cultural identities of our students, providing opportunities for creative expression and exploration, and fostering supportive communities, programs like STEM From Dance are paving the way for a more inclusive and joyful future in STEM. As we continue to innovate and advocate change, let us remember that the true measure of success lies not only in academic achievement but also in the joy, empowerment, and sense of belonging we instill in every student, regardless of their background or identity. Together, let us cultivate a world where all students can pursue their passions, unleash their potential, and find joy in the journey of learning.

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Authors

Yamilee Toussaint (STEM From Dance) 
Jennifer Loving

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