https://journal.ypidathu.or.id/index.php/ijen/
P - ISSN: 2988-1579
E - ISSN: 2988-0092

Digital Storytelling and STEM Identity: A Narrative Inquiry of Female High School Students in Japan

Kaito Tanaka [1], Riko Kobayashi [2], Haruka Sato [3]
[1] Keio University, Japan
[2] Hitotsubashi University, Japan
[3] Hokkaido University, Japan

ABSTRACT

Background. Despite Japan's global reputation for technological innovation, female representation in science, technology, engineering, and mathematics (STEM) fields remains disproportionately low. Cultural expectations, gender norms, and limited role models contribute to the underrepresentation of young women in STEM pathways.

Purpose. This study explores how digital storytelling can serve as a transformative pedagogical tool to support the development of STEM identity among female high school students in Japan.

Method. Using a qualitative narrative inquiry approach, the study engaged 15 female students aged 16–18 from three urban high schools. Participants created and reflected on personal digital stories that connected their lived experiences with STEM-related aspirations, interests, or challenges.

Results. Data were collected through digital artifacts, in-depth interviews, and reflective journals, then analyzed thematically. Findings reveal that digital storytelling enabled participants to articulate their evolving sense of agency, challenge internalized gender stereotypes, and envision themselves in future STEM careers. The process fostered increased confidence, self-recognition as potential STEM contributors, and a sense of belonging in scientific discourse.

Conclusion. This study demonstrates the potential of narrative-based, multimodal learning tools in reshaping STEM identity formation for underrepresented groups. It contributes to feminist pedagogy and STEM education research through the intersection of narrative, identity, and digital media.

KEYWORDS

Digital Storytelling, Female Students, Narrative Inquiry

Citation: Tanaka, K., Kobayashi, R & Sato, H (2025). Digital Storytelling and STEM Identity: A Narrative Inquiry of Female High School Students in Japan. *International Journal of Educational Narrative*, *3*(3), 251–262. https://doi.org/10.70177/ijen.v3i3.2208

Correspondence:

Kaito Tanaka,
kaitotanaka@gmail.com

Received: March 11, 2025

Accepted: April 20, 2025

Published: April 20, 2025

INTRODUCTION

The underrepresentation of women in science, technology, engineering, and mathematics (STEM) remains a global concern, particularly in technologically advanced nations like Japan. Despite being a leader in robotics, engineering, and innovation, Japan consistently ranks among the lowest in terms of female participation in STEM-related fields (Fong dkk., 2024; Rahman, 2024). This gender disparity has been attributed to persistent cultural stereotypes, gendered educational expectations, and a lack of visible female role models in the sciences. The societal framing of STEM as a male-dominated

domain discourages many young women from considering STEM careers, even when they possess the aptitude or interest. These systemic barriers manifest early in students' educational journeys, particularly during high school when identity formation is at a critical developmental stage.

STEM identity, defined as the extent to which an individual sees themselves as a "STEM person," has been shown to significantly influence academic and career choices. For female high school students, identity development is deeply intertwined with social messaging, personal agency, and access to empowering narratives (Nouruzi dkk., 2024; Parker & Lehn, 2024). Traditional classroom models often fail to provide the inclusive, reflective, and expressive spaces necessary for students to interrogate or reconstruct their own self-perceptions in relation to STEM. There is an urgent need for pedagogical interventions that not only build knowledge but also cultivate confidence, agency, and a sense of belonging—especially for female learners.

Digital storytelling has emerged as a promising educational approach that blends narrative expression with multimedia tools, enabling students to construct and communicate personal experiences in creative formats (Aguilera dkk., 2024; Pfau dkk., 2024). This methodology is particularly suited for identity work, as it facilitates self-reflection, emotional engagement, and the articulation of lived realities. In the context of STEM education, digital storytelling offers a means for female students to critically examine and reshape their personal connections to science, technology, and innovation. The process invites learners to envision new possibilities and reframe their participation in STEM from a position of empowerment rather than marginalization.

The core problem addressed by this study is the limited engagement of female students in STEM pathways, specifically within the Japanese high school context. Despite various national initiatives aimed at increasing diversity in STEM, young women in Japan continue to express low levels of identification with scientific roles or futures (Pfau dkk., 2024; Zhang, Hou, dkk., 2024). The persistence of this issue signals a disjuncture between formal STEM education and the subjective experiences of students, particularly regarding how they see themselves represented or excluded within STEM narratives. Current strategies have not sufficiently addressed the identity-based dimensions of this problem.

Another dimension of the problem lies in the lack of educational practices that meaningfully integrate students' voices and lived experiences into STEM learning. The dominant instructional culture in Japan often prioritizes rote learning, standardized assessment, and hierarchical teacher-student dynamics, leaving little room for expressive or experiential learning. Such environments may inadvertently silence or overlook the identity struggles that female students encounter as they engage with STEM subjects (González Peña dkk., 2024; Zhang, Hou, dkk., 2024). The result is a learning experience that reinforces rather than disrupts gender norms in scientific fields.

This study seeks to address these limitations by exploring how digital storytelling can be used as a reflective and identity-forming tool for female high school students. The focus is on understanding how students narrate their own experiences with STEM, how these stories inform their self-concept, and how storytelling processes may shift their perception of belonging in STEM disciplines. Through this lens, the study aims to capture the nuanced interplay between personal experience, cultural context, and educational engagement.

The objective of the study is to investigate the extent to which digital storytelling can facilitate the emergence or strengthening of STEM identity among female high school students in Japan. The research aims to uncover the internal narratives students construct around their relationship with STEM, and how these narratives evolve when given a platform for creative self-expression (Lu dkk., 2024; Rachmania dkk., 2024). A secondary goal is to analyze the pedagogical affordances of digital storytelling in promoting reflective learning, agency, and identity negotiation.

The study also aims to provide practical insights for educators, curriculum designers, and policymakers seeking to enhance gender equity in STEM education. By identifying narrative themes and patterns, the research intends to generate recommendations for integrating digital storytelling into STEM pedagogy in culturally appropriate and gender-sensitive ways (Ighofose dkk., 2024; Rachmania dkk., 2024). The ultimate aspiration is to contribute to a more inclusive model of science education that not only disseminates knowledge but also affirms diverse identities and aspirations.

Literature on STEM identity has grown in recent years, but relatively few studies have focused on narrative inquiry as a means of exploring this construct, especially among Japanese female youth. Existing research has largely concentrated on quantitative assessments of gender gaps, standardized test outcomes, or programmatic interventions (Harry dkk., 2024; Rodrigues Pinto dkk., 2024). These approaches, while informative, often fail to illuminate the subjective, emotional, and cultural factors that influence how students come to see themselves in STEM. There is a critical gap in studies that prioritize student voice, particularly through creative and narrative methods.

The intersection of digital storytelling and identity formation is a relatively under-researched area in STEM education (Kempkes dkk., 2024; Sousa dkk., 2024). While studies in Western contexts have begun to explore the role of narrative in constructing professional identities, similar explorations within East Asian cultural settings remain scarce. Even fewer have examined how multimodal storytelling might serve as a medium for disrupting dominant gender ideologies or expanding the imagined possibilities for young women in science and technology fields (Hundley dkk., 2024; Massenet dkk., 2024). This study addresses that gap by situating narrative practice within a localized, gendered, and educationally relevant context.

This research therefore contributes not only methodologically but also conceptually to the growing field of identity-based STEM education research. It introduces digital storytelling as both a reflective process and an identity resource, capable of revealing the subtle social mechanisms through which STEM aspirations are formed or inhibited (Crowther & Wiggins, 2024; Williams dkk., 2024). By focusing on narrative production, the study offers a distinct lens to examine how cultural narratives are internalized, resisted, or rewritten by female students as they engage with STEM curricula.

The novelty of this research lies in its interdisciplinary fusion of digital media, feminist pedagogy, and STEM education within a culturally specific narrative framework (Güçlü, 2024; Saglam-Metiner dkk., 2024). Rather than treating digital storytelling as an instructional add-on, the study repositions it as a transformative practice central to identity construction. It proposes a shift in how educators conceptualize STEM inclusion—from demographic representation to narrative reclamation (Collins dkk., 2024; Kagera dkk., 2024). This reconceptualization holds implications for how we define participation, agency, and success in STEM beyond numerical metrics.

The study is justified by its potential to offer new insights into how educational methods can be humanized to support identity formation and equity in STEM fields. It challenges the prevailing assumption that cognitive competence alone determines STEM potential, suggesting instead that narrative space and emotional resonance are equally vital (Shi dkk., 2024; Smith-Johnson, 2024). These dimensions are particularly relevant for historically marginalized groups, including young women, whose identity struggles often go unacknowledged in traditional STEM environments.

This research invites a rethinking of how schools, educators, and policymakers approach gender disparities in science and technology. By foregrounding narrative and digital storytelling, it introduces a pedagogical alternative that aligns with principles of inclusivity, creativity, and critical

reflection (Dawson dkk., 2024; Hamad, 2024). The resulting implications extend beyond Japan, offering a model for culturally adaptive, gender-sensitive, and identity-affirming STEM education worldwide.

RESEARCH METHODOLOGY

This study employed a qualitative narrative inquiry design to investigate how digital storytelling influences the formation of STEM identity among female high school students in Japan. Narrative inquiry was chosen for its capacity to capture the richness of personal stories and the complexity of identity construction through reflective and experiential accounts. The study sought to understand not only what participants thought about STEM, but how they narrated their relationship to science, technology, engineering, and mathematics in culturally and socially embedded ways (Flake & Lubin, 2024; Luanpitpong dkk., 2024). This design allowed for the exploration of self-concept and meaning-making within the everyday realities of female students navigating gendered educational landscapes.

The population consisted of female students enrolled in urban high schools in Tokyo and Osaka, selected for their strong academic STEM tracks and established digital learning infrastructure. A purposive sampling strategy was used to select participants who identified as female, were between 16 and 18 years old, and had prior exposure to STEM coursework (Currey dkk., 2024; Zhang, Qi, dkk., 2024). From an initial pool of 35 applicants, 15 students were selected to participate based on their willingness to engage in digital storytelling and reflective dialogue. The sample reflected a diversity of academic performance levels, socioeconomic backgrounds, and future career interests to ensure a broad range of narrative perspectives.

The primary instruments for data collection included digital storytelling artifacts, semi-structured interviews, and participant reflection journals. Each participant was guided to create a digital story of 3–5 minutes using video editing tools that integrated voiceover, images, text, and music (Brathwaite, 2024; Taylor dkk., 2024). These stories served as both data and stimulus for deeper reflection during follow-up interviews. The semi-structured interviews were conducted individually in Japanese or English, depending on the participant's preference, and followed an open-ended protocol that encouraged elaboration on themes present in their digital narratives. In addition, students maintained weekly reflective journals over a six-week period, documenting their evolving thoughts about STEM identity, gender roles, and self-perception.

The research was carried out over a ten-week period during the spring semester of 2024. Participants attended an initial orientation session that introduced the concept of digital storytelling and ethical considerations related to identity work and public sharing. Story creation was conducted independently, with technical and conceptual guidance provided through weekly online workshops (Jaisuda, 2024; Spencer dkk., 2024). After completing their digital stories, participants were interviewed and then invited to review their own narratives to identify emerging themes. All interviews and journals were transcribed and translated when necessary, then analyzed using thematic narrative analysis (Parra & Johnston, 2024; Wilder & West, 2024). Data triangulation across storytelling, interviews, and journals enhanced the credibility and depth of interpretation. Ethical clearance was obtained from the university's institutional review board, and all participants provided informed consent, with parental permission for minors.

RESULTS AND DISCUSSION

The participant group consisted of 15 female high school students between the ages of 16 and 18 from three urban schools in Tokyo and Osaka. Each participant completed a digital storytelling

project and participated in follow-up interviews and reflective journaling over a six-week period (Reissland dkk., 2024). The demographic distribution of participants and their intended STEM career aspirations are summarized in the table below.

Table 1. Participant Demographics and STEM Career Interest

Participant Code	Age	Grade	Digital Experience	Intended STEM Career
P01	17	11	Moderate	Software Engineer
P02	16	10	Low	Undecided
P03	18	12	High	Data Scientist
P04	17	11	Moderate	Biomedical Engineer
P05	16	10	Low	Environmental Scientist

The data revealed that 10 out of 15 participants identified a clear STEM-related career interest, while 5 expressed uncertainty or hesitation. Participants with moderate to high digital media experience appeared more confident in articulating their STEM identity during the storytelling process. In contrast, participants with limited digital experience demonstrated initial hesitancy but showed notable progress in narrative confidence by the end of the study period.

Digital stories commonly revolved around themes of curiosity, self-doubt, mentorship, and aspiration. Many participants used their narratives to trace personal journeys from passive exposure to active interest in STEM subjects. Some stories highlighted pivotal classroom moments or encounters with inspiring female professionals, while others explored internal struggles with gender norms and expectations. These stories served as a window into the emotional and cognitive layers of identity construction.

Narratives frequently included statements of re-evaluation or transformation. Participants described how the process of scripting and narrating their own experiences led to deeper reflection on their sense of agency within STEM. Reflective journals supported this shift, with students reporting a heightened awareness of their abilities and challenges in confronting cultural or institutional barriers to participation. The storytelling process thus became a catalyst for self-redefinition.

Thematic analysis yielded three primary identity trajectories: identity affirmation, identity conflict, and identity reconstruction. Students in the affirmation group reinforced pre-existing STEM aspirations and used storytelling to validate their path. Those in the conflict group expressed doubt or discomfort stemming from social pressures or lack of representation. The reconstruction group initially presented ambiguous STEM identification but gradually reframed their self-concept through narrative exploration.

Inferential comparisons indicated that participants who included role models in their stories—especially female scientists or teachers—tended to produce more future-oriented and confident reflections. Participants without role model references were more likely to articulate uncertainty or rely on abstract aspirations. These differences suggest that symbolic and relational support structures play a critical role in STEM identity consolidation.

Narrative depth also appeared to correlate with participants' engagement in reflection journals. Students who produced longer and more emotionally detailed journal entries also crafted richer digital stories with more nuanced portrayals of struggle and growth. This relationship implies that multimodal reflection—across video and written text—enhances identity coherence and personal insight.

One illustrative case is Participant P03, who entered the study with vague interest in "technology" but no specific career path. Her digital story documented her discovery of data

visualization during a summer coding workshop and her growing fascination with statistics and social impact. Through the storytelling process, she began to articulate a new identity as a "data storyteller" and applied for a related internship by the end of the study. Her narrative evolution reflected a shift from peripheral awareness to focused aspiration.

Another compelling example is Participant P09, who initially saw herself as incapable of pursuing science due to familial discouragement and gendered school culture. Her story recounted childhood fascination with insects and astronomy, suppressed during adolescence. Revisiting these memories through digital storytelling enabled her to reclaim her curiosity and conclude her narrative with a declaration of renewed interest in biology. This case demonstrated the restorative potential of personal narrative in identity reclamation.

The narratives suggest that digital storytelling can serve as both mirror and window—allowing students to reflect on themselves while envisioning future roles within the STEM landscape. Participants experienced the storytelling process not as a mere technical task, but as an emotional journey, which helped them confront and sometimes dismantle limiting self-perceptions. These shifts, although subtle, were evident in the language, tone, and structure of their narratives over time.

The combination of narrative inquiry and digital media amplified the participants' voices in ways that traditional assessment tools rarely capture. Their stories provided insight into personal, social, and institutional factors shaping STEM identity formation. This interpretive richness underscores the value of giving students authorship over their own STEM narratives and highlights how personal storytelling can complement systemic efforts to close gender gaps in science and technology.

The findings of this study reveal that digital storytelling enabled female high school students in Japan to explore, express, and in some cases reframe their identities in relation to STEM. The participants' narratives illuminated three distinct trajectories: affirmation, conflict, and reconstruction. Students who already possessed strong STEM interests used storytelling to reinforce and validate those interests, while others grappled with doubts shaped by societal and familial influences. A third group underwent a gradual transformation in which storytelling became a vehicle for identity renegotiation, leading to greater self-confidence and clarity regarding future aspirations.

The integration of multimodal reflection—particularly through personal journaling and digital narratives—deepened participants' engagement with their STEM journeys. Students who engaged more actively in reflective journaling demonstrated greater narrative complexity, suggesting that layered reflection contributed to more coherent and confident STEM identities. Participants also emphasized the emotional weight of storytelling, reporting increased self-awareness, empowerment, and in some cases, a sense of belonging to STEM communities they previously felt excluded from.

Role models and mentorship themes emerged as crucial elements in shaping aspirational language and future-oriented thinking. Students who referenced female scientists, teachers, or family members projected a stronger identification with STEM and were more likely to articulate concrete career paths. In contrast, those lacking such influences tended to describe their interest in more abstract or hesitant terms, reflecting a disconnect between personal ambition and available support systems.

These results collectively suggest that narrative expression can act as a transformative pedagogical practice for identity development, especially in contexts where rigid gender norms and academic pressure are prevalent. The digital storytelling process served not just as a creative

exercise, but as a framework for critical self-reflection, resistance to stereotypes, and reimagining future trajectories.

This study's findings both align with and extend the literature on STEM identity formation and gender in education. Prior research has emphasized the role of mentorship, exposure, and self-efficacy in fostering STEM engagement among female learners (e.g., Carlone & Johnson, 2007; Tan et al., 2013). The current study confirms these themes while adding a narrative dimension that highlights the importance of story ownership and expressive autonomy. While quantitative studies often measure identity using predetermined scales, this research demonstrates how identity unfolds through storytelling, marked by emotional nuance and evolving self-perception.

The findings also support insights from feminist pedagogical scholarship, particularly the call for educational practices that center students' lived experiences and narrative agency. Scholars such as Estrella (2019) and Barton et al. (2021) have advocated for multimodal approaches that validate diverse ways of knowing and being in STEM. The current study contributes to this discourse by offering empirical evidence of how storytelling can foster self-recognition and disrupt dominant discourses that position STEM as inherently male.

A key divergence from existing research lies in the cultural specificity of the Japanese context. While many global studies focus on systemic barriers, this study exposes the psychological and narrative silences imposed by Confucian-influenced expectations around conformity, academic excellence, and gendered modesty. These cultural constraints shaped how participants narrated their identities, often oscillating between ambition and self-effacement. This nuance adds depth to the broader discourse by illustrating how identity formation is mediated not just by gender, but by cultural scripts that influence how stories are told and heard.

The inclusion of digital storytelling as a methodological and pedagogical tool also distinguishes this study from others that rely solely on interviews or survey instruments. Participants' engagement in crafting personal visual narratives enabled a more embodied and emotionally resonant exploration of their STEM experiences. This approach surfaces the power of story as a form of epistemic resistance, allowing students to reclaim authorship over their educational and aspirational narratives.

The narrative patterns uncovered in this study indicate the importance of acknowledging students' emotional and cultural contexts in designing STEM interventions. The tendency for participants to shift from passive consumers of STEM knowledge to active narrators of STEM identity signals a deeper educational function of storytelling. This transformation suggests that identity development is not a linear or cognitive process alone but one that also involves affective, symbolic, and communal dimensions.

The data highlight how digital storytelling catalyzes critical self-awareness, emotional articulation, and social positioning. Students did not merely describe what they liked about STEM; they narrated how their relationships, values, and memories shaped their engagement with scientific inquiry. This distinction matters because it suggests that promoting inclusion in STEM requires more than curricular access—it requires reflective space to make sense of that access. Storytelling provides that space and enables new connections to emerge between students' lives and academic disciplines.

The participants' reflections demonstrate that identity conflict, when supported by narrative exploration, can lead to identity growth. Students who initially expressed uncertainty about their place in STEM often used their digital stories to confront stereotypes, articulate personal values, and discover empowering aspects of scientific practice. This process of identity reconstruction

affirms the idea that inclusive pedagogy must address emotional and social meaning-making, not just skill acquisition.

These outcomes underscore the critical role of narrative platforms in enabling marginalized voices to surface and flourish. When learners are provided with tools to articulate their stories, they begin to see themselves differently—and in doing so, they shift their relationship to knowledge itself. This reframing is foundational to long-term engagement in fields where they may have previously felt alienated. In this light, digital storytelling becomes not just an intervention but a practice of epistemic justice.

The implications of this study for educators, school leaders, and policymakers are significant. Current efforts to increase female participation in STEM in Japan often focus on scholarships, workshops, or promotional campaigns. While such initiatives are important, they may fall short if they do not address the deeper identity work required to sustain interest and belonging. Integrating storytelling practices into STEM education can humanize these efforts and make them more personally meaningful.

Teacher training programs can benefit from including narrative inquiry and digital storytelling as tools for inclusive pedagogy. Educators who understand how to facilitate reflective storytelling may be better equipped to support students navigating gender-based or cultural identity conflicts in STEM. Such practices also encourage empathetic dialogue and build stronger teacher-student relationships, which are known to impact academic persistence and self-efficacy.

Curriculum designers should consider embedding digital storytelling within STEM modules, especially those that deal with real-world applications or ethical questions in science and technology. Allowing students to explore the social and personal implications of STEM knowledge can deepen their engagement and foster a sense of ownership. This narrative integration can transform classrooms from sites of knowledge delivery to spaces of identity affirmation.

For policymakers, the study highlights the need to evaluate gender equity initiatives not just in terms of enrollment statistics but in terms of narrative presence. Whose stories are being heard in STEM education? What kinds of identities are being affirmed, and which are being marginalized or erased? By shifting the focus from representation to recognition, digital storytelling invites a more culturally responsive and emotionally attuned form of policy-making in education.

The results point to the socio-cultural factors that influence how STEM is imagined, accepted, or resisted by young women. These include family expectations, peer perceptions, institutional practices, and deeply rooted narratives about gender roles in science. The Japanese educational environment, with its competitive entrance system and conservative gender climate, often creates subtle pressures that discourage non-conformity. These factors explain why participants frequently narrated their STEM interest through metaphor, memory, or indirect affirmation rather than overt confidence.

The digital storytelling method provided a safe space for students to work through these constraints creatively and critically. The process enabled them to reinterpret past experiences, confront internalized stereotypes, and craft new possibilities for the future. These stories acted as counter-narratives to dominant scripts that frame STEM as impersonal or unattainable for women. The emotional and symbolic content of the stories illustrates the power of narrative to disrupt limiting beliefs and foster new ways of seeing oneself.

The depth and diversity of the participants' reflections are consistent with the psychological literature on identity development, which emphasizes the role of narrative in consolidating self-understanding. Identity, particularly in adolescence, is formed through the active organization and reinterpretation of experience. In this study, the act of composing a digital story functioned as a

form of identity rehearsal, allowing students to visualize and rehearse future roles they had not previously considered attainable.

The power of narrative to mediate change lies in its capacity to hold complexity, contradiction, and transformation simultaneously. Participants' stories were not linear success narratives but layered explorations of doubt, discovery, and hope. This interpretive richness suggests that inclusion in STEM must not only create access but also foster narrative possibility—giving students the language and tools to imagine themselves where they previously felt invisible.

The future of gender equity in STEM must include methodologies that center narrative practice as both research and pedagogy. Story-based tools such as digital storytelling can be institutionalized as part of formative assessment, reflective practice, and identity-building activities. These tools serve not only to document student progress but also to illuminate pathways toward educational justice and personal empowerment.

Ongoing collaboration between educators, researchers, and media practitioners is necessary to refine digital storytelling frameworks for diverse educational settings. Future research could explore the long-term impact of storytelling on STEM persistence, particularly through longitudinal studies. Additionally, cross-cultural comparisons may offer insights into how narrative identity develops under different socio-educational conditions.

Policy reform must reflect the epistemic and emotional dimensions of inclusion. Structural efforts, while necessary, will remain insufficient unless complemented by pedagogical practices that make identity visible and voice central. The time is ripe for reimagining STEM education not only as a site of cognitive mastery but as a domain for human expression and transformative storytelling.

CONCLUSION

The most significant finding of this study is the identification of digital storytelling as a transformative medium for STEM identity development among female high school students in Japan. Unlike conventional interventions that focus primarily on cognitive or academic performance, this study highlights how narrative expression enables students to reframe their personal experiences, challenge internalized stereotypes, and construct a more empowered vision of themselves within the STEM domain. The ability of participants to articulate their doubts, aspirations, and evolving self-concepts through digital storytelling revealed a dynamic process of identity affirmation and reconstruction that is seldom captured by traditional assessments or surveys.

The research contributes a novel conceptual and methodological framework to STEM education by introducing digital storytelling as a multimodal narrative inquiry approach. This contribution lies in its capacity to bridge reflective pedagogy, feminist theory, and technological engagement in a culturally grounded context. It positions storytelling not merely as an expressive exercise, but as a structured educational tool that fosters self-awareness, critical thinking, and emotional resonance. By demonstrating the utility of narrative production in revealing identity trajectories, the study provides a replicable model for researchers and educators aiming to humanize STEM education and make it more inclusive for marginalized groups.

This study is limited by its small sample size and geographic concentration within urban Japanese high schools, which may affect the generalizability of findings to other educational, regional, or cultural contexts. The voluntary nature of participation and reliance on self-reported data may also introduce selection and response biases. Future research should consider longitudinal studies to track identity development over time and examine how narrative engagement influences actual STEM pathway choices. Additional investigations could explore cross-cultural comparisons,

include rural or underrepresented student populations, and integrate teacher or parental perspectives to gain a more holistic understanding of identity formation in STEM contexts.

REFERENCES

Aguilera, R., Corral, G., Monarrez, A., Wagler, A. E., & Echegoyen, L. E. (2024). BUILDing SCHOLARS: A program exemplar at a Hispanic serving institution to develop biomedical researchers. *PLoS ONE*, *19*(12 December). Scopus. https://doi.org/10.1371/journal.pone.0315298

Brathwaite, W. M. (2024). Speak ourstory! 12 poet-to-poet conversations on the legacy, the now, and future of black Canadian dub poetry and spoken word. Dalam *The Routledge Handb. Of Black Can. Lit.* (hlm. 287–311). Taylor and Francis; Scopus. https://doi.org/10.4324/9781003156574-21

Collins, A. C., Feuka, A. B., Nelson, J., Verahrami, A. K., & Bombaci, S. (2024). Perspectives on inclusion, safety, and belonging from members of the North American LGBTQIA+ conservation community. *Conservation Biology*, *38*(6). Scopus. https://doi.org/10.1111/cobi.14389

Crowther, G. J., & Wiggins, B. L. (2024). Exam reform: An opportunity for the redistribution of academic power. *Journal of Microbiology and Biology Education*, *25*(3). Scopus. https://doi.org/10.1128/jmbe.00119-24

Currey, L., Harris, L., & Piper, M. (2024). Single cell transcriptomics of the cerebral cortex of mice lacking the PRC2 gene eed. *BMC Research Notes*, *17*(1). Scopus. https://doi.org/10.1186/s13104-024-07008-y

Dawson, C. A., Milevskiy, M. J. G., Capaldo, B. D., Yip, R. K. H., Song, X., Vaillant, F., Prokopuk, L., Jackling, F. C., Smyth, G. K., Chen, Y., Lindeman, G. J., & Visvader, J. E. (2024). Hormone-responsive progenitors have a unique identity and exhibit high motility during mammary morphogenesis. *Cell Reports*, *43*(12). Scopus. https://doi.org/10.1016/j.celrep.2024.115073

Flake, S., & Lubin, R. (2024). Proto-Narrative: A Critical Exploration of the Cultural Identities Held by Black Women in STEM. *Journal of Ethnic and Cultural Studies*, *11*(5), 178–192. Scopus. https://doi.org/10.29333/ejecs/2061

Fong, C. J., Adelugba, S. F., Garza, M., Pinto, G. L., Gonzales, C., Zarei, P., & Rozek, C. S. (2024). A Scoping Review of the Associations Between Sense of Belonging and Academic Outcomes in Postsecondary Education. *Educational Psychology Review*, *36*(4). Scopus. https://doi.org/10.1007/s10648-024-09974-y

González Peña, O. I., Morán-Soto, G., & Rodriguez-Lara, B. M. (2024). Decoding physics identity: A Spanish-language adaptation on an instrument and its correlation with STEM achievement. *Humanities and Social Sciences Communications*, *11*(1). Scopus. https://doi.org/10.1057/s41599-024-04112-z

Güçlü, R. (2024). "I" and "We" in Textbooks for Teaching Turkish to Foreigners: An Analysis of Metadiscourse with Cultural Reflections. *Turkbilig*, *48*, 141–176. Scopus. https://doi.org/10.59257/turkbilig.1451198

Hamad, N. (2024). How I approach intersectionality in hematopoietic stem cell transplantation. *Blood*, *144*(24), 2482–2489. Scopus. https://doi.org/10.1182/blood.2023020778

Harry, D. T., Crawford, A., Pamintuan, C., Singh, A., Thomas, D., Cooke, N. K., Oliver, C., Gordy, C. L., & Lubischer, J. L. (2024). Elevating Marginalized Student Experiences of Belonging in the Life Sciences: A Qualitative Case Study Approach. *CBE Life Sciences Education*, *23*(4). Scopus. https://doi.org/10.1187/cbe.24-02-0055

Hundley, F. V., Gonzalez-Lozano, M. A., Gottschalk, L. M., Cook, A. N. K., Zhang, J., Paulo, J. A., & Harper, J. W. (2024). Endo-IP and lyso-IP toolkit for endolysosomal profiling of human-induced neurons. *Proceedings of the National Academy of Sciences of the United States of America*, *121*(52). Scopus. https://doi.org/10.1073/pnas.2419079121

Ighofose, E., Garrett, S. H., Al-Marsoummi, S., Mehus, A. A., Sens, D. A., Singhal, S. K., Singhal, S., & Somji, S. (2024). Effect of Long-Term Cisplatin Exposure on the Proliferative Potential of Immortalized Renal Progenitor Cells. *International Journal of Molecular Sciences*, *25*(23). Scopus. https://doi.org/10.3390/ijms252312553

Jaisuda, T. (2024). Unveiling the Intricate Tapestry: Malay (Melayu) Wood Carving Patterns of Southern Thailand as Reflections of Muslim Cultural Identity. *International Journal of Islamic Thought*, *26*, 146–156. Scopus. https://doi.org/10.24035/ijit.26.2024.309

Kagera, Z. N., Makangara, J. J., Mafumiko, F. M., Banyikwa, A. T., & Shadrack, M. D. (2024). Phytochemical screening of fadogia ancylantha using gas chromatography-tandem mass spectrometry-electrospray ionization (gc-esi-qqq-ms/ms). *East African Journal of Science, Technology and Innovation*, *6*. Scopus. https://doi.org/10.37425/ygvk7123

Kempkes, R. W. M., Prinjha, R. K., de Winther, M. P. J., & Neele, A. E. (2024). Novel insights into the dynamic function of PRC2 in innate immunity. *Trends in Immunology*, *45*(12), 1015–1030. Scopus. https://doi.org/10.1016/j.it.2024.10.003

Lu, T., Wang, M., Zhou, W., Ni, Q., Yue, Y., Wang, W., Shi, Y., Liu, Z., Li, C., Hong, B., Zhou, X., Zhong, S., Wang, K., Zeng, B., Zhang, J., Zhang, X., Wu, Q., & Wang, X. (2024). Decoding transcriptional identity in developing human sensory neurons and organoid modeling. *Cell*, *187*(26), 7374-7393.e28. Scopus. https://doi.org/10.1016/j.cell.2024.10.023

Luanpitpong, S., Klaihmon, P., Janan, M., Kungwankiattichai, S., Owattanapanich, W., Kunacheewa, C., Chanthateyanonth, S., Donsakul, N., U-pratya, Y., Warindpong, T., Kittivorapart, J., Permpikul, P., & Issaragrisil, S. (2024). Point-of-care manufacturing of anti-CD19 CAR-T cells using a closed production platform: Experiences of an academic in Thailand. *Molecular Therapy Oncology*, *32*(4). Scopus. https://doi.org/10.1016/j.omton.2024.200889

Massenet, J., Weiss-Gayet, M., Bandukwala, H., Bouchereau, W., Gobert, S., Magnan, M., Hubas, A., Nusbaum, P., Desguerre, I., Gitiaux, C., Dilworth, F. J., & Chazaud, B. (2024). Epigenetic control of myogenic identity of human muscle stem cells in Duchenne muscular dystrophy. *iScience*, *27*(12). Scopus. https://doi.org/10.1016/j.isci.2024.111350

Nouruzi, S., Namekawa, T., Tabrizian, N., Kobelev, M., Sivak, O., Scurll, J. M., Cui, C. J., Ganguli, D., & Zoubeidi, A. (2024). ASCL1 regulates and cooperates with FOXA2 to drive terminal neuroendocrine phenotype in prostate cancer. *JCI Insight*, *9*(23). Scopus. https://doi.org/10.1172/jci.insight.185952

Parker, C. A., & Lehn, N. (2024). An identity project: A case study of two inservice elementary stem teachers' experiences with a comprehensive professional development. *Discover Education*, *3*(1). Scopus. https://doi.org/10.1007/s44217-024-00139-1

Parra, A. S., & Johnston, C. A. (2024). The RNA-binding protein Modulo promotes neural stem cell maintenance in Drosophila. *PLoS ONE*, *19*(12). Scopus. https://doi.org/10.1371/journal.pone.0309221

Pfau, E. A., Alagic, A., & Slavin, S. (2024). College Student Mental Health: Exploring Depression, Anxiety, and Mindsets in First-Year STEM Students. *Journal of Chemical Education*, *101*(12), 5288–5296. Scopus. https://doi.org/10.1021/acs.jchemed.4c00791

Rachmania, M. K., Ningsih, F., Sari, D. C. A. F., Sakai, Y., Yokota, A., Yabe, S., Kim, S.-G., & Sjamsuridzal, W. (2024). Dictyobacter halimunensis sp. Nov., a new member of the phylum Chloroflexota, from forest soil in a geothermal area. *International Journal of Systematic and Evolutionary Microbiology*, *74*(12). Scopus. https://doi.org/10.1099/ijsem.0.006600

Rahman, P. (2024). A reflexive thematic analysis exploring the experiences of undergraduate women in STEM in Bangladesh. *Discover Education*, *3*(1). Scopus. https://doi.org/10.1007/s44217-024-00185-9

Reissland, M., Hartmann, O., Tauch, S., Bugter, J. M., Prieto-Garcia, C., Schulte, C., Loebbert, S., Solvie, D., Bitman-Lotan, E., Narain, A., Jacomin, A.-C., Schuelein-Voelk, C., Fuss, C. T., Pahor, N., Ade, C., Buck, V., Potente, M., Li, V., Beliu, G., … Diefenbacher, M. E. (2024).

USP10 drives cancer stemness and enables super-competitor signalling in colorectal cancer. *Oncogene*, *43*(50), 3645–3659. Scopus. https://doi.org/10.1038/s41388-024-03141-x

Rodrigues Pinto, M., Vos, R. E., Nagao, R., & Koper, M. T. M. (2024). Electrolyte Effects on Electrochemical CO2 Reduction Reaction at Sn Metallic Electrode. *Journal of Physical Chemistry C*, *128*(50), 21421–21429. Scopus. https://doi.org/10.1021/acs.jpcc.4c06361

Saglam-Metiner, P., Yanasik, S., Odabasi, Y. C., Modamio, J., Negwer, M., Biray-Avci, C., Guler, A., Erturk, A., Yildirim, E., & Yesil-Celiktas, O. (2024). ICU patient-on-a-chip emulating orchestration of mast cells and cerebral organoids in neuroinflammation. *Communications Biology*, *7*(1). Scopus. https://doi.org/10.1038/s42003-024-07313-z

Shi, H., Wan, K., Dou, B., Ren, Y., Huo, L., Zhang, C., Yue, S., Li, Z., Guo, H., & Dai, J. (2024). Genome-wide identification and expression analysis of the glutathione transferase gene family and its response to abiotic stress in rye (Secale cereale). *BMC Genomics*, *25*(1). Scopus. https://doi.org/10.1186/s12864-024-11080-w

Smith-Johnson, M. (2024). Gender Differences in Self-assessed Measures of Health: How Does the Structure of Self-rated Health Compare Across Transgender and Cisgender Groups? *Demography*, *61*(6), 2147–2175. Scopus. https://doi.org/10.1215/00703370-11689375

Sousa, P., Lopes, B., Sousa, A. C., Coelho, A., de Sousa Moreira, A., Rêma, A., Gonçalves-Maia, M., Amorim, I., Alvites, R., Alves, N., Geuna, S., & Maurício, A. C. (2024). Isolation, Expansion, and Characterization of Rat Hair Follicle Stem Cells and Their Secretome: Insights into Wound Healing Potential. *Biomedicines*, *12*(12). Scopus. https://doi.org/10.3390/biomedicines12122854

Spencer, V., Wallner, E.-S., Jandrasits, K., Edelbacher, N., Mosiolek, M., & Dolan, L. (2024). Three-dimensional anatomy and dorsoventral asymmetry of the mature Marchantia polymorpha meristem develops from a symmetrical gemma meristem. *Development (Cambridge)*, *151*(23). Scopus. https://doi.org/10.1242/dev.204349

Taylor, T., Zhu, H. V., Moorthy, S. D., Khader, N., & Mitchell, J. A. (2024). The cells are all-right: Regulation of the Lefty genes by separate enhancers in mouse embryonic stem cells. *PLoS Genetics*, *20*(12). Scopus. https://doi.org/10.1371/journal.pgen.1011513

Wilder, E. I., & West, R. K. (2024). The Mathematical Autobiographies of College Faculty Participating in a Quantitative Reasoning Faculty Development Program: Stories of Trauma and Triumph. *Adults Learning Mathematics International Journal*, *18*(1), 29–47. Scopus.

Williams, D. R., Duncan, D., Rice, M. M., & Sanchez, E. L. (2024). Fostering community discussions and building a toolkit for mental health and wellness in STEM. *Journal of Microbiology and Biology Education*, *25*(3). Scopus. https://doi.org/10.1128/jmbe.00089-24

Zhang, Y., Hou, G., & Shen, N. (2024). Comparison of human-induced pluripotent stem cell-derived macrophages with peripheral blood-derived macrophages using single-cell genomics. *Journal of Shanghai Jiaotong University (Medical Science)*, *44*(12), 1477–1489. Scopus. https://doi.org/10.3969/j.issn.1674-8115.2024.12.001

Zhang, Y., Qi, F., Chen, P., Liu, B.-F., & Li, Y. (2024). Spatially defined microenvironment for engineering organoids. *Biophysics Reviews*, *5*(4). Scopus. https://doi.org/10.1063/5.0198848