

Reflection, Reflexivity, and Science Identity in an Undergraduate Research Program

Rocío Mendoza, *University of Redlands*
Ann Y. Kim, Gino Galvez, Chi-Ah Chun,
California State University, Long Beach

Abstract

This study shares student perspectives regarding participation in an iterative reflection activity on identities that was embedded in an undergraduate research training program. The activity, which took place across multiple points in time, was designed to create space and opportunity for students with multiple, diverse identities and experiences to explore and reflect on how their identities existed together in the context of their academic research experiences. Findings suggest that the act of thinking, writing, and sharing encouraged students to reflect on their own identities, beliefs, and growth over time. This helps address the deeply embedded disciplinary cultures that can shape students' perceptions of themselves and tensions by expressing their multiple identities in an academic research and STEM environment.

Keywords: *minority serving institution, qualitative, research experiences for undergraduates, STEM, underrepresented minority*

doi: 10.18833/spur/8/2/2

Student retention and persistence in science, technology, engineering, and mathematics (STEM) has been an issue for decades, particularly in undergraduate research experiences (UREs; e.g., Seymour and Hewitt 1997). One aspect of addressing STEM retention is encouraging students to develop a science identity (Schwartz et al. 2010) and understanding URE practices that contribute to successful identity exploration and development and the barriers that impede this process. Science identity can be broadly

defined as the ways one perceives oneself to be aligned with or a part of the science community (Carlone and Johnson 2007). Higher levels of science identity are associated with positive outcomes, including academic performance, persistence, matriculation in graduate programs, and entry into the workforce (Chang et al. 2008; Estrada et al. 2011; Robinson et al. 2018). Identifying with science, however, can be more difficult for some students, especially individuals who identify as women, LGBTQ+, or have minoritized racial or ethnic backgrounds (Hughes 2018; Ong et al. 2011). This is due to the often gendered and racialized environments and STEM disciplinary cultures that can further marginalize and isolate students from specific backgrounds (Carter, Razo Dueñas, and Mendoza 2019). Their success in STEM fields depends on the development of their science identity and their other personal identities (Chang et al. 2008; Hurtado et al. 2009; Jackson et al. 2016).

Traditionally, research on science identity development has emphasized the role of conventional research activities. Science identity is expected to grow or strengthen as students acquire knowledge of scientific research methods, hands-on research skills, and professional development experiences, such as research presentations and networking with others at professional conferences. These elements are regarded as best practices for undergraduate research training programs. Authors argue that also central to student development of a science or research identity is having a safe space, support, and guidance to engaging in reflection.

Although reflection has several definitions across fields and disciplines, early ideas of reflection are attributed

to John Dewey (1933). They include the following four criteria, as outlined by Rodgers (2002): (a) it is a meaning-making process that helps a person move to deeper levels of understanding; (b) it is systematic and follows a disciplined process; (c) it is communal, meaning that reflection does not happen in isolation, but with others; and (d) it needs to prioritize or value the “intellectual growth of oneself and others” (845). Because undergraduate student identity development is a fluid, nonlinear, and ongoing process (Patton et al. 2016), reflection can be a powerful means for facilitating students’ science or research identity development.

To facilitate reflection on the development of a science or research identity, the authors developed a writing and peer-sharing intervention for an undergraduate research training program (referred to hereafter as the training program) that supports students pursuing research and graduate degrees in the biomedical field. There is a long tradition across fields and disciplines, such as health, social psychology, and education, of using writing exercises to foster reflection. Scholars have facilitated writing exercises to explore psychological well-being (Pennebaker 1997; Walton and Cohen 2011), a sense of belonging in undergraduate education (Jehangir 2010; Walton and Cohen 2007, 2011), and academic achievement (e.g., Cohen et al. 2009; Sherman et al. 2013; Walton and Cohen, 2007; Walton et al. 2015). This article presents the formative evaluation of a reflective writing and peer-sharing intervention through analysis of students’ perceptions of engaging in such an activity. Reflection is essential to the learning process in undergraduate research spaces, where the discussion of personal identities may not be encouraged in academic departments, particularly in STEM; further, reflection through writing can be a powerful tool when guided appropriately to facilitate these topics. The following question guided the research: What role does reflection play in identity exploration among undergraduate students in a research experience training program?

Methods

This study takes a qualitative approach to examining the role of a reflection activity in the identity exploration of undergraduate students participating in a research experience training program. The training program was a federal grant-funded, two-year URE aimed at diversifying the behavioral and biomedical science research enterprise by encouraging minoritized STEM students to pursue PhD programs. The training program was implemented in a broad-access, baccalaureate-granting, minority-serving institution, with Hispanic Serving Institution (HSI) and Asian American and Native American Pacific Islander Serving Institution (AANAPISI) designations. Since 2015, the training program has enrolled 391 undergraduate students. In the 2020–2021 years (from which these data are derived), the reflection activity was introduced to the 16 students in the first-year cohort.

The training program’s curriculum was designed to cultivate research skills and personal and professional (science or research) identity development among its participants (see Urizar et al. 2017 for a detailed description). The reflection activity consisted of a writing and peer-sharing exercise repeated three times over the course of the two years that students participated in the training program. In the beginning of their first year, students answered two writing prompts as homework (see CSULB n.d.). The first prompt asked whether students had thought about themselves as a researcher or scientist, whether this perception blended with other identities, and how these identities played out in different environments (e.g., working in a lab versus being at home with family). The second prompt asked students to think about how their identities and roles might have informed or impacted the research they were pursuing or their intended future career. Two weeks later, students participated in a peer-sharing activity, discussing their responses in their weekly Learning Community (LC) classes. In preparation for peer sharing, students were instructed to reread their written responses. Students responded in writing to the same prompts and repeated the peer-sharing activity another two times, at the midpoint and the end of the program.

Participants

Six students participated in the study. Table 1 contains relevant participant demographic characteristics. The interview participants represented over one-third (37.5 percent) of the entire trainee cohort, and its demographic distribution was comparable to that of the overall trainee cohort except for the greater representation of students from behavioral sciences in the sample.

Data Collection

All 16 students in the first-year cohort of the training program were invited to participate in interviews about their involvement in the reflection activity, and six students (37.5 percent) volunteered. Data were drawn from three semistructured group or individual interviews, and students participated in the interviews based on their availability; this resulted in three students participating in the first interview, two students in the second interview, and one student in the third interview. A semistructured interview guide was developed consisting of two segments: the first segment aimed to better understand the impact of the reflection activity on the students’ exploration as scientists or researchers. Students were asked to comment on what it was like for them to reflect on their identities, whether they had ever thought about their identities in this way, how the “reflexive” (reflecting on reflections) aspect of the activity informed their identity as a scientist or researcher, and whether the reflections on their identity influenced their career goals or future plans. The second segment of the interview guide focused on the students’ experience of the activity itself. Students were asked to

TABLE 1. Participant Information

Student	Gender	Race/ethnicity	First-generation (FG) undergraduate student	Financial aid eligible (FAE)	Major
Alyssa	Female	Non-Latinx White	Yes	Yes	Biochemical engineering
Diana	Female	Latinx	No	Yes	Psychology
Esther	Female	Latinx	Yes	Yes	Chemical engineering
Jackie	Female	Latinx	Yes	Yes	Chemistry
Noah	Male	Non-Latinx multiracial	No	Yes	Psychology
Robin	Female	Latinx/White	No	No	Psychology
Participant breakdown	83.3% Female	66.7% Latinx	50% FG	83.3% FAE	50% Behavioral sciences
Cohort breakdown	81.3% Female	62.5% Latinx	62.5% FG	75% FAE	37.5% Behavioral sciences

Note: Participants are identified with pseudonyms for confidentiality.

comment on what it was like to repeat this activity over the two-year period, what it was like for them to talk about their identity in this way with their peers, whether and how it was different to do the peer sharing virtually and in person, and if there were other activities or experiences in the program that might have helped them think about their identities as well. The interviews took place virtually on Zoom and were recorded with participants' permission. Interviews ranged from about 40 to 60 minutes and were moderated by one to two members of the research team, consisting of faculty members and a postdoctoral fellow involved in the reflection activity development. The study was approved by the institution's internal review board.

Data Analysis

The digital interview recordings were first transcribed with an AI transcription program and the files were further cleaned up by a research team member. All research members conducted a close line-by-line reading of each transcript individually, taking an open coding approach (Saldaña 2021) and making notes and observations across the three interview transcripts. Inductive and deductive coding were applied to new student impressions or experiences that emerged, based on the original aims of the reflection activity regarding identity and science or researcher identity. The open coding was transferred to a shared document, on which codes were further segmented and categories were refined into themes (see Table 2). To ensure trustworthiness, one transcript was initially reviewed together by the research team, discussing the similarities and differences and addressing intercoder

reliability. Intercoder reliability was ensured by adhering to specific recommendations, including involving a minimum of two coders, ensuring that at least one coder was not involved in data collection, requiring prior experience with coding, using a consistent analytical lens (both inductive and deductive), establishing a shared understanding of codes through dialogue and consensus, and developing a codebook to maintain consistency in the coding process (Cofie, Braund, and Dalgamo 2022). The team also met weekly during the month-long data coding phase to discuss how the coded segments illuminated the experiences of the participants and reconcile any differences in coding and interpretation by data analysis.

Results

Theme 1

Students may not readily reflect on personal identities in academic settings. Participants reported feeling initially skeptical of the activity because reflecting on their personal identities was not traditionally valued or related to their academic experiences. This was evident in Esther's response, who initially questioned why she was being asked to write about her identities, "It was just a little foreign to me, . . . being asked that question. No one had ever asked me that question before. I hadn't really considered it myself beforehand. So, I think a lot of it was just . . . [the] raw emotion of 'Why are they asking me, this?' . . . 'Why do they want to know?' 'Why is it important, even?'" Esther provided insight into how foreign of a concept it was for her to write about personal identities in an academic setting.

TABLE 2. Open Coding Process

Theme 1: Students may not always readily reflect on personal identities in academic settings.	
<i>Open Codes</i>	<i>Groups</i>
<p>Writing about themselves often felt “foreign”; some asked, “How do I do that?”</p> <p>Text: “I have never done that before.”</p> <p>“But it kind of . . . brought . . . some anxiety, . . . the first time I wrote it because . . . I didn’t know. . . I guess I hadn’t really thought about it in that way . . . my personal identities and . . . doing research, I hadn’t yet made that connection, on my own.”</p>	<p>Students may not always naturally reflect on personal identities in academic settings.</p> <p>Writing about personal identities may feel foreign.</p>
Theme 2: Writing as both a cognitive and reflection tool to help students learn about themselves and challenge existing beliefs.	
<i>Open Codes</i>	<i>Groups</i>
<p>Writing seems to help “unravel”/untangle/work out/open up/support their ideas of learning about themselves.</p> <p>Text: “It was . . . a process to think about it, and then, once I actually did write it, . . . I felt . . . a little bit better about . . . the whole situation.”</p> <p>“I was . . . do I say this . . . I don’t even know if this is real or not, and so it was kind of . . . very soul searching.”</p> <p>“Just . . . being a professor and . . . having Dr. Z be someone who is Mexican and I’m Mexican having that connection with him . . . I was able to . . . think about that more and elaborate on that more in the assignment and really . . . understand the importance of that.”</p>	<p>The writing forced the student to pause and consider what they were going to write about.</p> <p>The writing served as a place to think.</p> <p>Writing as a way to process thoughts and feelings about their undergraduate research experiences.</p>
Theme 3: Writing as a place for reflection, reflexivity of identities, and future pursuits.	
<i>Open Codes</i>	<i>Groups</i>
<p>Writing could be a place to process and reflect and think about future positions and career aspirations.</p> <p>Text: “Yeah so that was . . . a really weird experience, because I, when I was reading the first one that I wrote, I was . . . that doesn’t even sound like me. . . I was so scared and I was so . . . insecure or nervous or worried about all these different things.”</p> <p>“The identity writing was more about the science side and what my career would be in. You know . . . my position in an academic setting. So it definitely helped sort of shape my understanding of what my role was in terms of . . . as a student or . . . in the future, what my role [will] be in terms of, you know.”</p>	<p>The writing and sharing component helped students be aware of their identity development process.</p> <p>Reflection writing can provide an opportunity to observe one’s own growth.</p>
Theme 4: The role of multiple reaffirming spaces promoted in the training program	
<i>Open Codes</i>	<i>Groups</i>
<p>Text: “And then I feel like the prompt kind of let me open up about it . . . and [the training program] encouraged [us] to see ourselves as researchers and scientists. And for me that wasn’t really the case at first, I like research, I like what I do, but . . . when people . . . like my family members, asked me, your friends, what do you do. I tell them I do research for a program at school, it’s kind of weird for me to say I’m a researcher and having these conversations, it’s kind of reaffirming and . . . validating that you know the work that I do is important.”</p> <p>“I’m sorry to say this . . . but in his lab . . . I was doing a lot of stuff just to learn how to be prepared for graduate school. But being in his lab while also being [in the training program I] learned how to do that simultaneously, you [are] also learning about my identity and myself. And it wasn’t until you guys kind of promoted that soul searching of what other dynamics . . . make you who you are. And so, when I was reading that it made me feel more comfortable to know that . . . I don’t have to be a robot.”</p>	<p>Research experience alone may not be enough to facilitate reflection.</p> <p>The program seems to encourage a complimentary and supportive environment to the undergraduate research experience.</p>

Similarly, Noah remarked on the lack of opportunities in undergraduate institutions to engage in reflection, “But there’s never really a time to look at yourself in a purely identity and kind of individual way.” Alyssa also had a similar response, sharing, “Honestly it wasn’t until I got into the program where I started . . . even thinking of myself as a scientist.” The fact that Esther and Alyssa are in different fields than Noah (chemical engineering, biochemical engineering, and psychology, respectively) and yet they had similar responses seems to reflect the broader academic environment, one which may not always promote or encourage such reflections or discussions.

Theme 2

Writing is both a reflection and a cognitive tool that supports learning about oneself and challenges existing beliefs. The written part of the reflection activity allowed participants to pause and think about themselves as they thought about what to write. Robin, for example, talked about reflecting on her LGBTQ+ identity, being of Mexican descent and having been raised by white parents, which were identities she seldom claimed aloud. She explained, “I just didn’t know what to write about so I . . . feel like I could have gone with a couple of different directions and so it was . . . a process to think about it.” She recognized she could have written on various topics to fulfill the activity expectations and had to try to determine what she would write.

Additionally, having the space for students to consider several ideas and decide on what to commit to paper encouraged participants to utilize this activity to challenge their previously held ideas about being a researcher or scientist. Esther explained:

In order to be successful in my identity as a researcher, I had to kind of hide my identity as a Mexican American, first generation, female . . . scientist engineer. . . I was always aware that I was brown, that I was a woman, that it wasn’t the norm in engineering or STEM . . . so I never really thought about it. But I was aware of that. It wasn’t until [the training program] and the assignment that I was really kind of pushed to confront that aspect of my life.

Before this writing activity, Esther confessed she had not questioned why she could not identify as Mexican American or first-generation or a woman while being a scientist engineer; her response suggests that she had accepted that these two identities were mutually exclusive. The reflection activity challenged participants to question these beliefs. Robin summed it up by sharing, “Doing the assignment . . . you . . . see all parts of you, and how all those things can kind of exist together in your mind or in your own reality, and I think it’s . . . really important.”

Those wholistic understandings of themselves seemed to provide confidence for future pursuits. For Esther, the reflection activity built confidence about applying for graduate schools she initially believed were out of reach:

Before the assignment I would have never considered applying to schools like the UCs for graduate school. I thought that was crazy. I thought, OK, maybe I can do research and look for a master’s then, and maybe even a PhD. But I wouldn’t apply to any of the UCs right away because I thought it was too difficult . . . and they required the best of students, the most capable, the most worthy. And so, after the assignment I realized that I was competitive. I was competitive because of my different identities I brought to the table. [I have] diversity . . . a different perspective, a different way of solving a problem, a different way of overcoming challenges. And so, after the assignment, I was more confident in applying to these schools. And I applied to . . . UCLA, and I got accepted.

The experience of seeing themselves wholistically and writing down experiences and milestones functioned as a mirror for students to see that they were, indeed, capable and worthy of pursuing research and science.

Theme 3

Writing was a place for reflection and reflexivity of identities and future pursuits. Having students revisit their written prompts and repeating the writing activity allowed for reflection and reflexivity. Reflexivity, different from reflection, requires a close examination of one’s self-reflection and positionality in relation to one’s social world (Pillow 2003). Students had opportunities to reflect upon their reflections, which gave them a window into what they were contemplating at a given moment in time and how their perceptions of their identities in the context of their research and science pursuits had changed. Robin recalled rereading her first written response as if she were reading another person’s entry, “So that was . . . a really weird experience, because when I was reading the first one that I wrote, I was . . . that doesn’t even sound like me. . . . I was so scared, and I was so insecure or nervous or worried about all these different things.” By revisiting what she had previously written, Robin observed how much she had hesitated writing about her multiple identities, to the point she did not even recognize an earlier version of her writing. Alyssa chimed in with a similar reaction, “I feel pretty similar to Robin, in the way that I also am part of the LGBTQ+ community but I didn’t really know that [at the time of writing] . . . so I was . . . ‘Do I say this? I don’t even know if this is real or not,’ so it was very soul searching.” Alyssa added that she did not have a very close connection with her research mentor, “strictly classes and research,” so, as for Robin, it took courage to write about her identities and commit those identities to paper.

Jackie, a Latina majoring in chemistry, also described how the activity differed from her regular practice of personal journal writing, “because previously the journaling would be about my role as a sister or a daughter or whatever other role I have in my personal life . . . but the identity writing was more about the science side and what my career would be in.” Jackie continued describing her experience of having to revisit what she had previously written as part of the activity; looking back at her writing allowed Jackie to “think forward,” spurring thoughts about her intended career pursuit as an undergraduate instructor because it was “really, really helpful to . . . put my thoughts together in terms of my identity and my . . . position as a student now and then the future . . . as a professor.”

Other students’ reflexive process helped them to see their identities as sources of strength and pride. Esther reflected,

I ended up concluding, just this semester, a couple weeks ago . . . that my identities, they do blend well together. They actually helped strengthen my identity as a researcher and as an engineer. I think without my identities as a first-generation college student, Mexican American women in STEM, I don’t think I would have had such a, how can I say it, such a strong drive to push forward past my obstacles and challenges.

As she described above, these identities gave Esther the strength and confidence to pursue a career in chemical engineering, and through time and reflection she began to think about them in tandem. Broadly, revisiting their written prompts gave students the space to experience reflexivity as they looked back at their previous written responses, and for some, a previous version of themselves. Revisiting their prompts allowed them to confront previously held perceptions and observe how their identities changed over time.

Theme 4

The role of multiple reaffirming spaces promoted through the training program. The final theme is twofold: the value of a peer-sharing component and the broader role of the training program in creating safe and reaffirming spaces for students. The peer sharing took place during the LC class after students responded to the writing prompts. Participants described how the peer sharing helped strengthen a sense of community in the training program, as they learned they were not alone and that others faced similar challenges. This type of sharing was especially important for students like Diana who “struggled a lot with . . . calling myself a researcher and being confident in my research at first, especially because I felt like my identities clashed.” Diana later expanded, “To hear other people, that they feel the same . . . it’s kind of like everyone’s going through the same thing . . . I’m not the only one that feels this way.”

Discovering they were not alone in their struggles as they navigated the feelings of their “clashing” identities was a validating experience, which enabled students to give and receive emotional support to one another. Further, the peer-sharing component helped students to practice reflexivity verbally. Having the opportunity to examine and then share aloud in a communal setting in a safe and affirming space seemed to encourage students to be confident in acknowledging and often reconciling the multiple identities they held, at the same time as they were becoming a researcher or scientist.

The sense of affirmation students experienced through the activity also seemed to have a ripple effect across students’ sense of self and their interactions with faculty mentors. Some students spoke of how they were better able to have conversations with their faculty mentors because of the language and affirmations they received in the training program. Noah shared, “Being in [the faculty mentor’s] lab while also being in [the training program] I learned how to apply to graduate schools, simultaneously . . . also learning about my identity and myself.” Similarly, Robin, who was the only student who identified as part of the LGBTQ+ community in her lab, shared, “Having that assignment and being able to do it in [the training program] first helped me later on to have that conversation with [my faculty research mentor] and with my lab mates and then it didn’t feel as scary to do it.”

The reflection activity helped some students have more open communication with their mentors and lab mates, which led them to feel less alone and more able to be their authentic selves. Participant responses provided insight into how the reflection activity and the broader training program’s curriculum mutually reinforced identity exploration. Further, the reflection activity helped to meet the program’s goal of fostering the support and development of diverse scientists and researchers.

Discussion

This article highlights findings that emerged from students’ feedback regarding their experiences of an iterative reflection activity on identities that was part of a URE program. Further, the findings emphasized the important role URE programs have in creating opportunities in academic environments that have not previously done so. Students revealed deeply embedded beliefs about STEM disciplinary environments that posed barriers, particularly for minoritized students persisting in their majors, which is in line with existing scholarship (see Carter et al. 2019 and Hurtado et al. 2009). Through written and verbal reflections, students reported having the chance to process and challenge these beliefs. These reflection opportunities allowed students to reconcile tensions they often felt when it came to connecting their multiple personal identities with their science and research identities. Further, writing and reflecting on their

intended careers and sharing these ideas with others helped facilitate deeper shared meaning-making experiences (Rodgers 2002). In this way, participants were committing and recommitting to their intended academic goals.

The combination of engaging in written and verbal reflections over several occasions during the two years in the program was important for facilitating not only in-the-moment reflections but also reflexivity on topics and interpersonal interactions not readily encouraged or considered in university courses or even undergraduate research settings alone. URE programs can facilitate interactions and relationships for students engaged in research, which can in turn enhance academic experiences (Eagan et al. 2013). This has particularly important consequences for STEM students, as some highlighted that writing and discussing topics around identity initially seemed “foreign,” and previous research has noted that such discussions do not typically take place in the classroom, particularly in science fields (Cech 2013; Seymour 1999). Last, fostering a safe environment that provided support for exploration and reaffirmation of student identity as a researcher or scientist was equally important. Developmentally, undergraduate education is a time of gender and sexual identity exploration for many young people. How these explorations are nurtured by their environment can impact the way students interact with their faculty mentors and perceive the STEM environment.

Implications

Based on these findings, recommendations are provided for scholar practitioners interested in implementing reflection activities. First, it is important to set clear expectations by explaining that self-reflection can foster personal growth and change. This can help mitigate any unease or uncertainty associated with the process. Approaching these activities with intention and sensitivity, while acknowledging how academic disciplines can sometimes compartmentalize or suppress students’ identities, can help normalize these discussions.

Second, because reflective thinking often involves confronting doubts (Spalding and Wilson 2002), it is important to address the potential discomfort that may arise when exploring previously unquestioned beliefs about identity. Educators should be prepared to facilitate discussions that allow students to express and process their feelings. Also, situating these beliefs in broader societal contexts and recognizing that identity exploration in academic settings is not common can help students avoid feeling at fault for not having engaged in such reflection before. Finally, creating a safe environment in a program, classroom, or research lab is essential, because it can be a space for students to reflect on their higher education experiences. This can be fostered by framing conversations and activities; explicitly acknowledging structural inequalities in society and valuing the diversity, equity,

and inclusion of minoritized communities can help create safe spaces for students to explore identities and experiences in ways they might not have considered previously in traditional academic spaces. Cross-campus communication with faculty mentors and associated programs may help to open dialogue and opportunities in other spaces, and challenge disciplinary cultures that so often compartmentalize who one is and what one does in a classroom or lab space. Considering programmatic and institutional contexts, such as program curriculum and campus resources, will be critical.

Limitations

Because students participated in the training program during the shelter-in-place period of the COVID-19 pandemic, student experiences in the activity or their future career outlooks may have differed from normal circumstances. This means that findings may not be generalizable to all students currently in a similar program. Another limitation was the self-selection bias of the participants. Students volunteered to share their experiences in the reflection activity, and it is possible that only those who had positive experiences agreed to be interviewed. Given the exhaustion felt by everyone during the pandemic, the participants also may have been students who felt they could tolerate spending more time on Zoom with the interviewers. Still, the student responses helped the authors gain a deeper understanding of the reflection components of an undergraduate research training program and how it was particularly effective for minoritized students.

Another limitation was the lack of information about the trainees’ sexual orientation and gender identification. For students from the LGBT+ community, this presented an additional layer to identities and a unique dilemma of intentional disclosure, which comes with risks of stigma, rejection, and alienation. Their struggles with revealing their sexual identity to others in their lab and the training program was highly salient and required courage and risk-taking. Unfortunately, the training program did not collect information on its trainees’ sexual identity, and the information was only made available to the researchers when participants themselves disclosed it during the interview. Last, the small sample size of the study limits the generalizability of the data to a broader student population. Nevertheless, students’ candid responses provided valuable insights into the potential value of structuring opportunities for reflexivity and reflection through writing.

Conclusion

Undergraduate research programs are commonly highlighted as high-impact practices that support the development of a science identity (Hunter, Laursen, and Seymour 2007; Palmer et al. 2018). As demonstrated in this article, reflection activities, when situated within broader efforts to support minoritized students in the biomedical and social

science fields, are impactful because they create a space to reflect and help students reimagine the possibilities of pursuing STEM degrees and careers. URE programs may not always explicitly and intentionally include reflection opportunities. Therefore, reflection should be considered a necessary component of URE programs. Finally, considering the depth of the themes reported in this study, each holds promise as a prospective avenue for further research exploration and inquiry.

Data Availability

The data included in this article are not publicly available because of student participant confidentiality.

Institutional Review Board

Office of Research and Sponsored Programs, IRB approval no. 21-198.

Conflict of Interest

No known conflict of interest to disclose.

Acknowledgments

We would like to first thank the CSULB BUILD student trainees, graduate mentors, staff, and faculty training directors who have participated in the various phases of this activity development and implementation and given us their invaluable feedback. We also thank Dr. Bradley Pan-Weisz for the initial development work on the writing intervention and Drs. Que-Lam Hguyen and Angela-MinhTu Nguyen for their contribution to framing the intervention as a narrative inquiry and the share-out activity part of the intervention. And finally, we thank Ashley Colburn for the numerous data preparation efforts.

The published work was supported by the National Institute of General Medical Sciences of the National Institutes of Health under Award Numbers UL1GM118979, TL4GM118980, and RL5GM118978. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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Rocío Mendoza

University of Redlands, rocio_mendoza@redlands.edu

Rocío Mendoza is an assistant professor in the Department of Leadership and Higher Education at the University of Redlands. Prior to this, she was the postdoctoral dissemination research fellow for the California State University, Long Beach (CSULB) BUILD Program and a lecturer in the Student Development in Higher Education Program at CSULB. Mendoza teaches and writes about race and ethnicity, student identity, and institutional contexts in higher education.

Ann Y. Kim is an associate professor in the Department of Human Development at CSULB. Kim's research focuses on understanding and supporting student persistence and retention in STEM using an identity lens. She utilizes both quantitative and qualitative methodologies in research. She primarily teaches courses on quantitative research methods in social science and adolescent development.

Gino Galvez is an associate professor in the Department of Psychology and the director of the Center for Evaluation and Educational Effectiveness at CSULB. Galvez has played key roles as an investigator and lead evaluator on grant-funded projects. Broadly, his research has focused on interventions that broaden participation in STEM, underrepresented student success, undergraduate research training, and the development of science identity.

Chi-Ah Chun is a professor, department chair of psychology, and lead principal investigator of the CSULB BUILD Initiative Phase II. Her research has focused on mental health disparities in Asian immigrant and refugee populations. Chu also has led federally funded grants that provide rigorous research training in mental health and health disparities to underrepresented students and faculty over the last two decades.