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Lunch & Learn: Fostering Moments that Support Persistence for Community College STEM Students

Missy Cosby[a], Susan Dentel[b], and Vashti Sawtelle[c]

[a]Lyman Briggs College, Michigan State University, East Lansing, MI, USA; [b]Math, Science & Engineering Technology, Washtenaw Community College, Ann Arbor, MI, USA; [c]Department of Physics and Astronomy, Michigan State University, East Lansing, MI, USA

ABSTRACT

Community college STEM students often aspire to transfer to baccalaureate institutions to pursue careers requiring advanced degrees. To support their efforts, community colleges offer programming and support to aid degree attainment and transfer. While their community college experiences are critical to understanding the whole of STEM education research, few studies attend to these experiences and those that do often focus on curricula and teaching. This study contributes to the community college experience literature by evaluating Lunch & Learn – one component of a community college STEM Scholars program that was designed around model of student retention. The goal is to understand how Lunch & Learn supports transfer-intending STEM students. This longitudinal qualitative study uses iterative thematic analysis of observational data and an interview with the program's director to determine the most salient practices critical to persistence and retention. Findings indicate that this program supported social and academic integration by (a) sustaining a supportive social community, (b) providing opportunities to access and capitalize on information networks, and (c) building STEM student self-efficacy and identity. This work can inform the design of others' spaces within the community college structures that support the work done inside the classroom and how these programs are contributing to the successful transfer of STEM students.

Those interested in STEM often desire to pursue careers for which at least a bachelor's degree is necessary though the path to a bachelor's degree does not look the same for all. While we often think of bachelor's degree earners as students enrolled in universities as first-time-in-any-college (FTIAC) students, it is actually the case that community colleges (CCs) enroll a higher percentage of STEM degree earners than their university counterparts (Felkner et al., 2019). For example, upward of 35% of all undergraduates are enrolled in the nation's community colleges as science and engineering associate's degree attainment increased 136% since 2000 (Community College Research Center, 2022; National Science Board, 2018, 2020). CCs represent a large pool of future STEM professionals (Van Noy & Zeidenberg, 2014), yet only a small portion of university research focuses on the CC context (Kanim & Cid, 2020; Van Noy & Zeidenberg, 2014). Relatedly, while CC experiences are critical to understanding the whole of STEM education research, few studies attend to these experiences and the vast majority that do focus on curricula and teaching methods in the CC setting (Schinske et al., 2017). In this exploratory study, we depart from the examination of curricula and, instead, partner with a CC STEM program director to examine the culture of a CC classroom-adjacent space called Lunch and Learn (L&L) which is one component of a CC STEM program focused on

CONTACT Missy Cosby mdcosby@utk.edu Theory & Practice in Teacher Education, University of Tennessee, A410 Bailey Education Complex, 1126 Volunteer Blvd, Knoxville, TN 37916, USA

STEM student persistence and transfer. L&L sessions are held weekly and are attended by multiple cohorts of the CC STEM Scholars program where students congregate during a relatively unstructured time while enjoying a program-provided lunch for approximately 1 h. This time is followed by another hour of learning intended to continually reinforce professional, academic and life skill training, career/degree exploration, and research skills/knowledge. The second hour is facilitated by the program director, program staff, CC faculty, or other invited guests. The design of the larger CC STEM program was informed by Tinto (1993, 2010) model of student retention.

This study arose from our CC–university partnership facilitated by an NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) grant. The NSF S-STEM grants were established to support postsecondary institutions to fund scholarships for academically talented low-income students, to implement programs that support recruitment, retention, and graduation, and to study the implementation of such programming. The STEM Scholars program's director asked us as university researcher partners to help her understand the value that L&L was providing. Therefore, the purpose of this study was to explore the culture of one aspect of the larger CC STEM program and to attend to how, if at all, social and academic integration materialized in this classroom adjacent space for STEM students. Our efforts serve to extend the literature about what matters in sustaining CC STEM students on the path to successful baccalaureate attainment.

Guiding our work is the understanding that there are various factors impacting students as they seek to persist in their educational goals (Tinto, 2017) whether their goals be to earn a certificate or degree in their current institution or to transfer to another institution. Tinto's model of student retention (1993, 2010) describes an institution's goal to retain students to a certificate or degree, yet he acknowledges students' goals to persist whether that be to earn a certificate or degree in their current institution or transfer to another institution (Tinto, 2017). Tinto's (1975) model argues that, while considering individual characteristics, experiences, and commitments, the factors most impactful for persistence are the individual's integration into the college's (or university's) academic and social systems (Tinto, 1975). These two goals – that of student persistence and institutional retention – are tightly entangled for CCs, especially for those who see transfer for their students to baccalaureate institutions as the primary goal. Thus, we draw from work that centers both student persistence (e.g., Tinto, 2017) and institutional retention (e.g., Tinto, 2010) to understand the mechanisms through which these goals are accomplished. In this paper, we respond to Tinto's call (2010) to take the theoretical insight that academic and social integration matter and examine how a CC STEM program achieves this level of engagement. We ask: How does the Lunch and Learn (L&L) component of the STEM Scholars program function to support community college STEM transfer-intending students and encourage persistence?

CC and university efforts to address retention and persistence through STEM programs

Instead of asking if CC STEM students are transfer ready, the question could be whether or not institutions are ready to receive and support CC STEM transfer students (Fink, 2021). This framing shifts the onus from individual student persistence to institutional responsibility for retention. Several institutions have responded to the latter through establishing CC–university partnerships and programming. To ascertain how L&L is functioning for the CC STEM students that it serves, we needed a broad understanding of the mechanisms of other STEM programs that promote STEM student persistence and retention. In this section, we discuss what we currently know about six STEM programs (see Table 1) designed to meet the needs of the CC STEM student population.

STEM programs primarily use three approaches to inspiring STEM students: (a) early engagement in STEM research, (b) promoting active learning in introductory STEM courses, and (c) establishing STEM learning communities (Graham et al., 2013). Among the six studies of STEM programs we examined, there are a variety of foci, configurations, and programmatic elements both that are in line with and depart from the three general structures for programs Graham et al. (2013) puts forth. For example, several of the programs privilege early engagement in STEM research (i.e., Leggett-Robinson et al., 2015; Lenaburg et al., 2012; Strawn & Livelybrooks, 2012) while others value establishing

Table 1. CC–university partnership STEM program in the literature.

Citation	Program	Program Aims	Data collection
Anderson and Deil-Amen (2024)	STEMBridge Project	Provide culturally responsive mentoring and support CC STEM students transferring into university STEM majors	Focus group interviews
Leggett-Robinson et al. (2015)	3 + 8 Undergraduate research program	Utilize a cognitive apprenticeship approach to undergraduate research for CC students to support increased successful transfer	Surveys, focus groups
Lenaburg et al. (2012)	Expanding Pathways in Science, Engineering, and Mathematics (EPSEM)	Motivate CC STEM students through academic enrichment and introduction to university resources and mentoring in a research project	Pre- and post surveys, focus groups, and annual follow-up surveys
Lockwood et al. (2013)	Increasing Numbers, Connections, and Retention in Science and Engineering (INCRSE)	Build relationships between the university and regional community colleges necessary to recruit students and provide them with academic and social support, primarily through advising, for their retention once enrolled.	Not available
Shadduck (2017)	DCCCD STEM Institute	Uses a student/faculty cohort model with mentoring, professional skills programming, and scholarship support to provide opportunities for engagement, relationship building guidance, and encouragement for CC STEM students preparing to transfer	Surveys, focus groups,
Strawn and Livelybrooks (2012)	University Catalytic Outreach Research Experiences (UCORE)	Provide CC students with an opportunity to participate in a research experience to improve science self-efficacy and strengthen career prospects	Focus groups with science community college faculty

learning communities for students, faculty, and staff within and across institutions (Anderson & Deil-Amen, 2024; Lenaburg et al., 2012; Lockwood et al., 2013; Shadduck, 2017; Strawn & Livelybrooks, 2012). Some hone in on student experience while others acknowledge the work and professional development of faculty and staff. Some take more of a longitudinal approach following students from the CC through the transfer process and into their first year at the university, while others center experiences such a summer bridge institute. Due to this variance in program configuration and foci, we chose to impose some uniformity by examining what these studies tell us about three primary themes that emerged: (a) social and academic integration, (b) psychosocial factors such as motivation, sense of belonging, self-efficacy, and identity, and (c) attending to factors of culture and social identity such as race, gender, and language.

Social and academic integration in STEM programs

Social and academic integration occur when there is intellectual and social congruence between the student and the "values, social rules, and academic quality of the college community" (Deil-Amen, 2011, p. 55). In other words, when academic and social integration is successful, the student is able to see themselves as a part of the institutional community and seamlessly engages both academically and socially in ways that increase the probability of degree attainment. Barriers to academic integration include preparation for advance STEM coursework, registration and advising issues, lack of career planning and placement information, and inadequate meaningful faculty–student interaction (Lockwood et al., 2013). While fewer questions persist regarding the role of academic integration in the CC context, there is evidence that the impact of social integration varies with the age of the students (Sorey & Duggan, 2008), with environmental variables such as maintaining an outside job and family responsibilities (Bean & Metzner, 1987; Lockwood et al., 2013), and the impact of outside of college socialization influences (Wang, 2016).

Across the CC STEM programs we examined, academic integration was privileged in the design of programmatic elements and, therefore, featured prominently in outcomes for transfer-intending STEM students. Studies show that undergraduate research experiences were highly valued by students,

improved student research skills, increased the likelihood of successful transfer, and led to increased relationships between students and faculty (Leggett-Robinson et al., 2015; Lenaburg et al., 2012; Strawn & Livelybrooks, 2012).

Both faculty and peer mentoring also played a significant role in facilitating academic and social integration (Anderson & Deil-Amen, 2024; Lenaburg et al., 2012; Shadduck, 2017). Students ranked mentoring as highly impactful, in part, because these mentor relationships increased student knowledge of career options (Lenaburg et al., 2012; Shadduck, 2017). More specifically, the STEMBridge program documented the effects of culturally responsive mentoring, finding it instrumental for racially and linguistically diverse students to build connection outside of the typical STEM classroom.

There are other notable outcomes from these STEM programs such as increased initiative taking and increased comfortability presenting STEM research in public forums (Strawn & Livelybrooks, 2012). Though studies show that positive gains are being realized, what is less clear is how they are being realized. Questions remain around how academic and social integration function both separately and in conjunction with one another, particularly in the CC STEM context (Deil-Amen, 2011; Karp et al., 2010; Mertes, 2015; Tinto, 1997, 2017).

To investigate the potential interconnectedness for CC students, STEM or otherwise, Deil-Amen (2011) conducted a large longitudinal study with CC students and found support for a mixture of social and academic integration, dubbing these experiential moments as socio-academic. Deil-Amen (2011) argued that while academic integration "appears more salient" than social integration for CC students, academic integration took on a more social form and "social integration was often characterized by academic utility" (p. 82). These socio-academic moments described "opportunities for specific instances of interaction in which components of social and academic integration are simultaneously combined" (Deil-Amen, 2011, p. 72). For example, an older student with a family to raise can glean both social connection with others who understand their unique challenges and also exchange study techniques and other academic coping strategies fostering a sense of belonging and strengthening persistence. These moments extend beyond the traditional social integration mechanisms such as belonging to on-campus clubs and organizations. Deil-Amen (2011) emphasized the importance of classroom interactions for fostering these socio-academic moments. In fact, CC students expressed feelings of comfort and belonging in classrooms with approachable faculty and they "neither expected nor desired" these in-class relations with instructors and classmates to extend beyond class time.

Karp et al. (2010) found something slightly different as it relates to the interplay between social and academic integration for CC students introducing what they refer to as *information networks*. Similar to the functional aspect of socio-academic moments that usually do not extend beyond the classroom, these information networks represent "social ties that facilitate the transfer of institutional knowledge and procedures" (Karp et al., 2010, p. 76) and lead to benefits of campus connections, social contacts, and personal resources. In other words, these are social connections that lead to knowledge about prevalent information for academic success such as tutoring and other campus resources from classmates or faculty integrating a campus resource tour into their seminar course. These networks also led to an increased sense of belonging for CC students. While Deil-Amen's (2011) socio-academic moments provide a sense of belonging through empathy and classroom-oriented resources such as exchanging study strategies, Karp et al. (2010) argue that information networks helped students gain useful information about the institution at large such as the logistics of attending the CC (registration, graduation requirements), obtaining good course advice, and feeling like they had someone to go to for help. These information networks also, in turn, led to students feeling more connected to the college.

Karp et al. (2010) also examined how these information networks are formed. Like Deil-Amen (2011), they found that the primary space for developing these networks was in the classroom setting. These spaces provided opportunities for students to converse with one another or were courses specifically designed to provide information about the college. Considering Tinto (1993, 2010) model, it might appear that these information networks developed solely as part of academic integration. However, Karp et al. (2010) noted that these academic settings often led to social relationships.

Karp et al. (2010) writes, "For these students, relationships forged in class extended beyond the classroom. It is not easy to disentangle the ways in which these relationships lead to academic integration versus social integration; the two are very much interconnected" (p. 83).

Mertes (2015) posits that social integration for CC students "focuses much less on the social activities included in Tinto's model (2010) and more on peer groups centered around academically related activities and interactions with faculty and students inside the classroom" (p. 1054). Relatedly, Deil-Amen (2011) and Karp et al. (2010) attempt to describe such interrelatedness through constructs they identify as information networks and socio-academic moments, respectively. Mertes (2015) found that the social integration that Tinto (2010) describes is not all that different from what is being put forth as fundamentally different by others, yet what does differ is the way that social integration is connected to and facilitates academic integration.

Psychosocial development in STEM programs

While social and academic integration remain important, their consideration is necessary, but insufficient, as we consider the pursuit of a STEM degree. Psychosocial factors such as self-efficacy and science or STEM identity are also important (Hanauer et al., 2016). Prominent scholars have put forth conceptions of STEM identity that have been taken up by many STEM education researchers (i.e., Carlone & Johnson, 2007; Hazari et al., 2010; Martin, 2000). Each is constituted by components such as competency, socialization, recognition, beliefs in ability, and interest. As evidence of the importance of these factors, STEM programs both attempt to cultivate and influence these factors. Increases in self-efficacy (Bandura, 1977) featured prominently as an outcome across the STEM programs. Leggett-Robinson et al. (2015) found that undergraduate research opportunities lead to increased self-efficacy, science identity, and a sense of belonging in STEM. While Shadduck (2017) and Strawn and Livelybrooks (2012) found improvements in self-efficacy through vicarious learning for UCORE and DCCCD STEM institute students.

Culture and social identities in STEM programs

Community colleges enroll more than half of all Latinx and Native American students in higher education and nearly half of all Asian American and Black students as the retention and transfer rate of these students into baccalaureate degree-granting institutions remain low (AACC, 2019; Ma & Baum, 2016). And scholars have found that many do not experience STEM spaces as the race and culture neutral havens some purport them to be (McGee, 2021). The STEMBridge program was designed based on this premise as a CC–university partnership "to foster more inclusive STEM academic spaces by facilitating a culturally responsive bridged community of practice" (Anderson & Deil-Amen, 2024, p. 2). They found that race, gender, and language functioned differently at the community college versus in the university setting and the culturally responsive mentoring that students received improved how student experienced advising but did little to thwart racialized effects of STEM learning in classrooms. Overall, programmatic efforts were "wholly insufficient" when implemented without culturally responsive efforts in STEM teaching and within the curriculum (Anderson & Deil-Amen, 2024). Provided the diversity of CC STEM student populations, more work is needed in this area of study.

Motivating our study

Our literature review shows STEM programs for CC students foster academic and social integration through a variety of mechanisms, yet questions remain regarding their distinctiveness and interconnectedness. Additionally, when considering supporting CC STEM students, there is an added layer of psychosocial factors such as sense of belonging, STEM identity, and self-efficacy to consider. For existing programs that have tried to address these layered factors, we know that it is possible to have

a positive impact, but due to methodological approaches (surveys and focus groups), we know little about the mechanics of just how that impact happens. Provided that we want students to persist because of the institution, not in spite of it, it is important to know more about these mechanisms.

Our study provides both methodological and conceptual contributions through our ethnographic study of one component of a classroom-adjacent CC STEM program. In contrast to what already exists, we use research-embedded ethnographic practices to understand how social and academic integration happen for a group of transfer-intending STEM students. In doing so, we respond to Tinto's (2010) call to move beyond theories of student retention to specific examples and details of programs and practices that enhance academic and social integration in order to bolster student persistence. Our ethnographic investigation documents the practices of one component of a CC STEM Scholars program over several semesters to understand how student persistence and retention are fostered. We contribute to the literature by offering nuance as we work to make sense of how various constructs are related and connected. Our study seeks to ascertain how the Lunch and Learn component of a CC STEM Scholars program functions to support transfer-intending students and encourage persistence.

Methods

Context and participants

Established in the fall of 2018, the Washtenaw Community College (WCC) STEM Scholars Program was created to encourage, support, and facilitate success for students seeking degrees in STEM disciplines. This program was developed to offer WCC STEM Scholars comprehensive social, academic, and financial support. The focus of the program's efforts was to build a program for all STEM students that would constitute a pathway of comprehensive academic and psychosocial support, both pre and post transfer. The program works in partnership with Michigan State University, University of Michigan, Wayne State University, Western Michigan University, Mott Community College and MI-LSAMP (Louis Stokes Alliance for Minority Participation). Since its inception, the program has supported a total of 47 successful transfers to four-year institutions (see Table 2) with the average time to associate degree being 2 years.

Washtenaw is one of 28 public community colleges in the state of Michigan, and it is the fourth largest with a part-time/full-time total enrollment of greater than 20,000 students during the 2019–2020 academic year. In Table 3, we provide contextual demographics for understanding how the STEM Scholars compares with the "typical" CC student population in the state of Michigan (Michigan's Community College Data Inventory Report, 2020–2021).

The broader STEM Scholars program is structured around six (6) primary components: Summer Intensive, advising sessions, tutoring, mentor/mentee pairings, internships, and *Lunch & Learn* (L&L) (see Table 4). Only L&L is the context for this study, yet all six components work in conjunction with one another and Dentel is intimately involved with all program staff in each component. Cosby and Sawtelle attended and observed weekly L&L sessions: 10 in-person and 25 virtual (due to the COVID-19 pandemic) between Fall 2019 and Spring 2021. STEM Scholars met every Friday for 2 h for L&L during the academic year. Attendance is not mandatory but strongly encouraged as the program director and staff are particularly attuned to the fact that CC students have many pressures such as

Table 2. STEM Scholars who successfully transferred by Major (Fall 2018–Spring 2021).

CC Major	Number of successful transfers	% of successful transfers
Computer science	7	14.9%
Engineering	17	36.2%
Math	1	2.1%
Biology/Life Science	22	46.8%
Total	**47**	**100%**

Table 3. Demographic information for STEM Scholars vs state of Michigan CC.

Demographic Category	STEM Scholars	State of Michigan
Male	46%	44%
Female	54%	56%
First generation	37%	30% (*nationally)
Average age	23 years old	25.7 years old
White	63.3%	64.55%
Black	25.2%	17.05%
Hispanic	5.1%	4.11%
Asian American	5.1%	2.19%
Native American/Alaskan	1.3%	0.73%
Native Hawaiian/Pacific Islander	0%	0.12%

(Beer, 2016; Michigan Community College Association, 2022).
*State level data unavailable.

Table 4. The remaining five components of the STEM Scholars program.

Component	Brief Description
Summer Intensive	New STEM Scholars coming into the program participate in a 3-week summer intensive that prepares students academically and socially for their work at WCC and after they transfer.
Mentoring	STEM Scholars meet with their faculty/staff mentor once per month during the academic year.
Peer-Tutoring	STEM Scholars who had successfully completed several core courses were trained to be peer tutors in math, physics, chemistry and biology at no cost to the tutee.
Academic Advising	Implemented focused, adaptable academic advising with a dedicated academic advisor for the STEM Scholars.
Internships	Students are encouraged and assisted with applying for work/research internships.

children and/or other family responsibilities, part- or full-time work, clubs, sports, or other activities. L&L caters to first-year STEM Scholars, so attendance by other cohorts is more sporadic. There is continual reinforcement of professional, academic and life skill training, career/degree exploration, research skills/knowledge. The fall semester curriculum for L&L includes life-skill reinforcement, a transfer workshop, study skill work, wellness, an imposter syndrome workshop, and an internship workshop. The spring semester curriculum includes life-skill reinforcement, a transfer workshop, and the research curriculum (including library research workshop). Approximately 20 students attended L&L each week primarily from the most recent cohort.

Following a program provided, catered lunch (during in-person sessions), there is usually a facilitator that engages students around the topic for the week. Facilitators range from other members of the STEM Scholars staff, WCC faculty, faculty from university partners, and other WCC programmatic faculty and staff (i.e., librarians). A typical session structure includes an introduction, group work engagement, followed by whole group discussions; however, this varies depending on the topic and facilitators' style. Student involvement in group discussions and other activities is highly encouraged and embedded into the expectations and norms of the sessions.

At the start of the Fall 2021 semester, there were a total of 93 STEM Scholars. Our data was collected during the 2019–2020 and 2020–2021 academic years before the largest cohort of 60 students joined the program. All students must have a minimum high school GPA 2.7 or college GPA 2.0 at the time they apply and submit two letters of recommendation to be considered for the program. For acceptance, applicants are ranked based on GPA, STEM extracurricular work, quality of essays and recommendation letters. The number of STEM Scholars accepted into each cohort is determined by grant funding.

Positionality statements

We acknowledge that our positionalities impact our research through where we set our gaze during data collection and our role in analysis and interpretation of the data (Secules et al., 2021). Authors 1

and 3 acknowledged the fluidity of our outsider/insider status as it relates to culture and power at various stages of the research in this setting. Though we do not fully unpack these power dynamics in this project, we are aware that they exist (Secules et al., 2021). We also acknowledge that we did not attempt to detach who we are, but instead, leaned into our roles as educators, mathematicians, scientists, and people who genuinely care about student success.

According to Creswell and Poth (2016), "reflexivity in ethnography refers to the researcher being aware of and openly discussing his or her role in the study in a way that honors and respects the site and participants" (p. 474). We recognize how our own backgrounds and perspectives permeated the research process and recognize that others with different positionalities may engage in the same space and arrive at different interpretations and conclusions.

Cosby is a middle-aged, Black-American woman who studied mathematics at the undergraduate level and taught high school mathematics for over 20 years and who is very comfortable in classrooms and school settings. In fact, in addition to her role as a postdoctoral scholar on the university's research team, she continued to teach high school mathematics part-time during data collection and often spent time conversing with high school students about their post-secondary plans. She found it easy to strike up conversations with the scholars due to their shared interest in mathematics and science and she could imagine having taught many of them in high school. She took an observer as participant approach to this research (Glesne, 2016). Her role was primary observer, however, she did interact with and converse with scholars during lunch or in small groups during activities. As time progressed, she became more of an insider in the community participating in other community norms, assisting Dentel with planning and inviting speakers, and even presenting to the group alongside Sawtelle during one of the sessions in the spring of 2021.

Dentel is a gracefully maturing white woman and biology professor at Washtenaw Community College for more than 25 years. In addition to teaching, Dentel spearheaded the WCC STEM Scholars Program which was created to provide students with academic, financial, and social support and she currently serves as the director and leads the Lunch & Learn sessions (and did so during the time of data collection). It has been her passion to develop a program that truly helps students to be academically prepared and personally empowered for the rigors ahead of them so that they can be successful in the completion of STEM-based degrees ultimately entering into graduate schools and/or the professional workforce.

Sawtelle is a middle-aged white woman who is a physics professor at a local public university to which students from WCC are likely to transfer. As research lead on this project, she supervised data collection and analysis at all three campuses involved in this study (two regional community colleges and the large public university). She acted as a participant-observer in the first semester of data collection at WCC, focusing on understanding the structures of the setting and building relationships with the coordinators and students. Sawtelle has a long history of exploring self-efficacy in qualitative work (Sawtelle & Turpen, 2016; Sawtelle et al., 2012), thus her attention in this project often turned to student statements about competence and confidence. Sawtelle is not a CC transfer student herself, and in the data collection and analysis of this project committed to centering the voices of CC students. Generally, she acted primarily as an observer in the L&L setting, though students were comfortable with her and invited her into their small groups when they worked on a task.

Methodological approach

In general, an ethnographic approach allows a researcher to gain an understanding of how a group produces meanings in their daily lives, and how that meaning is shaped by the ways people think, feel, and act. The traditional model of ethnographic research (Spradley, 1980) allows the researcher to produce meaning through an understanding of what people do, what people say, and the types of artifacts that are produced. In this paper, Sawtelle & Cosby took a team ethnographic approach (Creese et al., 2008), meaning that we worked together to produce an understanding of the culture in the WCC STEM Scholars in the L&L space. This team ethnography approach adds accountability and

validity to the research process through adding information, challenging interpretations, and offering commentary (Erickson & Stull, 1998).

Data sources

Cosby and Sawtelle, acted as participant-observers (Becker & Geer, 1957), taking detailed fieldnotes across the 35 L&L sessions they attended from Fall 2019 through Spring 2021. This amounted to nearly 50 h of observation. These fieldnotes focused on patterns of interaction between participants in the L&L sessions (students, faculty, and staff) as well as detailed accounts of the daily activities. These observations included a group of special sessions that L&L refers to as a *Research Practicum* during the Spring 2021 semester. Research Practicum sessions are held at the same time as (and in lieu of) the original L&L sessions, but the Research Practicum sessions were led by WCC professors with specialties in information science, biology and microbiology, and engineering. This special sequence of sessions provided students the opportunity to learn about the research process within each discipline. In a typical semester, L&L would commence as normal across the first 10 weeks of the spring semester and Research Practicum would take place during the following 4 weeks.

In addition to observations and fieldnotes, in December 2020, Cosby conducted a semi-structured interview with Dentel to document the entirety of the STEM Scholars program and the design decisions in creating the L&L environment. This interview was recorded, transcribed, and included as part of the analysis.

Informed by our own positionalities, the process of taking and analyzing fieldnotes was iterative as we sought to describe and interpret patterns of behavior and culture in the L&L space that were both social and academic in nature. As we took fieldnotes, we set our gaze on what was happening, when it was happening, who was involved, and how it was happening (Emerson et al., 1995). The fieldnotes included direct quotes from students of stories that shared and about their feelings of competence or doubt in their abilities, photos of activities that they worked on during L&L sessions, and general patterns of interaction between students and between students and mentors. We paid particular attention to who was occupying the space and how they interacted with one another. Our fieldnotes include conversations between students that took place, references to emotions that we felt during interactions alongside the emotions we noticed others displaying (Emerson et al., 1995). Oftentimes, this was noted by the overall mood in the room or Zoom call (excitement, somber, celebratory, etc.).

Analytic process

We used iterative thematic inquiry (Morgan & Nica, 2020) to develop the themes and patterns we saw emerging in L&L. We first wrote summaries and analytic memos of our fieldnotes for each semester that we observed (Glesne, 2016). Our first semester of observation was in Fall 2019 and Sawtelle attended all of the L&L sessions, took fieldnotes, and summarized the fieldnotes. While summarizing the fieldnotes for Fall 2019, Sawtelle observed three preliminary, emergent themes across the data and supported these observations with evidence from the fieldnotes in her summary. The three emergent themes were as follows: (a) L&L's are one place where community is sustained, (b) informal conversations and exchanges during L&L led to important resources for supporting students both academic and personally, and (c) L&L provided opportunities for students to grow in their sense of competence as a science student by asking them to reflect on their roles and identities.

Cosby was the participant-observer for the following semesters (Spring 2020, Fall 2020, and Spring 2021). She also wrote analytic summaries at the conclusion of each semester and had no prior knowledge of Sawtelle's first semester emergent themes as she took fieldnotes throughout the Fall 2020 semester. While writing the Fall 2020 summary, she read Sawtelle's previously Fall 2019 analytic summary and noted overwhelming consistencies with her own observations. Cosby provided additional examples to support these emergent themes and noted expansions such as additional roles that Dentel, the students, or others such as invited speakers played in the space. Additionally, she noted

how the themes manifested in the virtual environment once the sessions shifted to GoToMeeting and Zoom due to the COVID-19 pandemic. Observations and note-taking continued during the Fall 2020 and Cosby and Sawtelle developed the protocol for Dentel's interview in conjunction with these themes.

Cosby and Sawtelle met weekly for data analysis and to discuss the literature relative to our observations. We also co-drafted the interview protocol during Fall 2020 for the interview with Dentel based on what more we wanted to understand from the first three semesters of observations and fieldnotes. The analysis of the interview data included thematic coding of the transcript according to three primary themes that previously emerged. In many ways, the interview data served to triangulate previous analyses, but also nuanced what we saw happening in the space from the perspective of the person responsible for much of the way that space was designed.

The analytic process was cyclical and one of iterative refinement (Schoenfeld, 1999) as where we were in constant conversation with the data, with one another, and with the literature on academic and social integration. After the interview with Dentel, Sawtelle and Cosby met several times to discuss our interpretations of the initial themes with respect to the literature. Our primary analytic focus shifted to how our initial and confirmed themes aligned with and departed from the social and academic integration literature. More specifically, we were interested in the presence of socio-academic moments as well as the emergence of information networks, the purposes they served, and the impact they had on student academic and social integration. In Table 5 we provide illustrative examples of how we moved from the raw fieldnotes data to analytic memos that summarized these data to connecting to the literature and building themes. This table provides a set of examples, but we also want to be clear that not all of the raw data fit cleanly into these rows. In some cases, our data and interpretation of data shifted as we worked toward summarizing themes in conversation with literature. This shifting of themes and data analysis is consistent with traditions that encourage the continual analysis and re-analysis of data while data collection is occurring (e.g., Maxwell, 2012).

In our process of analysis and connection to the literature, our themes shifted. We concluded that our first theme – L&L's are one place where community is sustained – primarily detailed how L&L helped to form and maintain social integration among students. Our second theme – informal conversations and exchanges during L&L led to important resources for supporting students both academic and personally – revealed how information networks were established and functioned in the space as well as provided additional context for the socio-academic moments where social integration was largely connected to academic utility. And finally, our third theme – L&L provided opportunities for students to grow in their sense of competence as a science student by asking them to reflect on their roles and identities – served to explain the psychosocial factors influenced, but not isolated to, these socio-academic moments and information networks. More explicitly, this hypothesis helped us to see, more specifically, the outcomes of these moments and networks for transfer intending STEM students as it relates to self-efficacy and identity.

Results

Overall, our analysis of the L&L classroom adjacent space for CC STEM students led to three specific findings. Originally, we asked: How does the Lunch and Learn (L&L) component of the STEM Scholars program function to support CC STEM transfer-intending students and encourage persistence? In short, we found that the L&L space magnifies the role of social integration among CC STEM students – a function that many questioned as necessary with this group. Secondly, we found that the L&L space was a vehicle for the formation of information systems (Deil-Amen, 2011) but instead of academic integration leading to social integration, it was reversed. In this case, social integration (through L&L) leads to academic integration. Lastly, we found evidence that L&L is a space that supports psychosocial development such as STEM identity and self-efficacy. These themes are not mutually exclusive and we found they are often integrated with one another.

Table 5. Examples of analytic emergence of findings.

Original Data	Analytic memoing	Connection to the literature
Sustaining Community→ Social Integration (Theme #1)		
From Fieldnotes on October 16, 2020: Dentel mentions that she needs to check in with P who has a heavy load of classes this semester. D said she was talking with P today and that he was planning to join. Dentel then mentions seeing A there and welcomes her since she hasn't been there. She says she has a conflict but wanted to join today for a few minutes. The two of them have a brief conversation.	This excerpt from the fieldnotes is an instance of how Dentel is so incredibly personable and makes real, genuine connections with the students. She often asks about family members and pets. Folks just seem to want to be there.	Dentel acts as the institutional agent in the L&L out-of-classroom space serving to support CC students' sense of "adjustment, comfort, belonging, and competence as college students" (Deil-Amen, 2011, p. 61). This social support provides opportunity for students to develop a socially-based STEM identity, which in turn has been linked to STEM persistence (Kim et al., 2018).
Informal Conversations and Exchanges → Information Networks (Theme #2)		
From Fieldnotes on October 16, 2020: J doesn't like the survey because he said it's related to mental health and managing emotions, but if you've gone through trauma, it's difficult to answer the questions. C doesn't like them either because of the relationship to OCD. J says he needs to take some brain classes because he knows that brains can rewire themselves. C says OCD is never gone, but L says it's manageable. C says his is better than it was a few years ago.	I am in one of the breakout rooms with a group of students. First they have a discussion around the task of making a list of the top three choices that successful students make. They come up with a top 3. They then shift to the task of taking a self assessment as an inventory of their own practices as a student. This leads to a seemingly natural conversation (not part of the instructions) about instructors and what it's like being fully online. They talk about unclear directions with typos on Blackboard (the learning management system) and the difficulty of typing math or entering equations correctly in these online math programs. They also have a brief discussion about mental health and managing it.	These three students use the academic activity of the self-assessment to broaden the discussion to mental health and navigating the shift to online. This L&L session provided opportunity for the students to converse with another and develop social ties that could ultimately lead to an information network (Karp et al., 2010) to transfer knowledge about mental health, instructors, and online teaching.
Impacting Psychosocial development of STEM learning (Theme #3)		
From Field Notes on October 11, 2019: Note taking exercise today. There are 3 assignments, which strategy is the best for that example? Setting was 3 passages with 3 forms of note taking. Some folks did divide and conquer. Dentel comes in and tells them to trade then or practice doing it individually. Getting done was not the point. The group I'm sitting with talks about the concept map strategy as one that might be useful for something they learned in bio yesterday.	This lesson stands out in my fieldnotes where students were given different science passages and different note taking strategies. Then they were asked to figure out which one would be best for each passage. At first I saw some folks playing a school's game where they were trying to match the correct answer or dividing up the work to get it done. But as the activity went on I heard students commenting on how this strategy was different than what they usually did, or how that one would be particularly good on chemistry where you have to memorize a bunch of things. This clear reflection on their experiences, combined with the opportunity to see improvement in a clear task could be a self-efficacy and identity building experience.	The L&L sessions provide space for meta-reflection about STEM learning and support the development of additional learning techniques. This activity provided students an opportunity to build a sense of self-efficacy in STEM learning and to reflect on scientific communities values in STEM classes (Hanauer et al., 2016).

Lunch and Learn (L&L) as primarily social

The STEM Scholars cohort program, in and of itself, is a formal, institutional approach to social integration into the CC community that fosters a sense of belonging. In the literature, it is often thought that the nature of life for CC students (commuting to campus, living at home instead of in dorms, working part-time or full-time jobs, raising a family) is incongruent with building and

sustaining relationships and being socially connected. Despite these circumstances and in lieu of the fact that the college does not hold Friday classes, the STEM Scholars came to campus to attend L&L sessions for 2 h on Fridays from noon – 2 pm (in-person) and later virtually during the pandemic.

We found that the sense of community that was fostered and sustained in L&L strategically preceded the more academically focused research practicum programming that took place during the Spring semesters. Furthermore, the sense of community materialized in a myriad of ways that were pivotal to the scholars feeling a sense of belonging and connectedness that was critical for persistence and retention at the start of and through the COVID-19 pandemic.

Almost immediately, it is evident to anyone who enters the L&L that it is a different kind of space. Both Sawtelle and Cosby were introduced to the space and observed several sessions over four semesters and often remarked to one another about how the space felt so welcoming and warm. Prior to COVID-19 restrictions and the onset of virtual L&L sessions, we noted several interactions in the L&L space that were indicative of the warm, welcoming, and celebratory, at times, nature of the space. One of the first observation notes made contained the words "So much energy!" We found that the STEM Scholars often began the lunch portion of L&L chatting with one another, which even sometimes included spontaneous bursts of claps and cheering when particular scholars entered the space. It was clear that there was an insider understanding of what this meant for the scholars and one that was always full of joy and laughter. Both Sawtelle and Cosby noted a genuine interest in spending time together among the scholars. Sawtelle noted that if she was to arrive 5 min early, she would find groups of students just chatting in the room. While Cosby noted several occasions where Dentel would end the sessions at 2 pm and, as she was leaving, would remind the groups of students who remained to just hang out and chat to be sure that they close the door and turn the lights off when they were finished.

In the interview with Dentel, she mentioned that the initial connections and formation of community are established during the Summer Intensive – a three-week orientation for new cohorts of STEM Scholars (see Table 3). She spoke about both the academic and social aspects of the Summer Intensive – highlighting the scholar's engagement in activities like salsa dancing and obstacle courses as opportunities for the scholars to bond. She mentioned that, even during the virtual Summer Intensive experience during the summer of 2020, this bonding was possible as it lessened feelings of isolation during the initial months of the pandemic. Dentel stated, "I think for many of the students in this group, their sense of isolation was decreased by having these sessions that were scheduled during the Summer Intensive. And they were getting to know each other. And we were doing some deep work." During both in-person and virtual iterations of the Summer Intensive, Dentel welcomed instructors whose approach to facilitation intentionally provoked the scholars to bond around really deep topics and express vulnerabilities mentioning that it can "get pretty emotional" at times. As Dentel spoke about the topics included in the summer intensive, she provided more insights into how community is established. She said:

> Let me just throw out stuff. So, personal value. Self-esteem. Self-efficacy.
>
> Self-responsibility. Conflict management. Critical thinking. We work a lot with cultural, you know, intercultural awareness.
>
> We do a financial literacy piece. So, we just, I mean, they get bombarded with stuff. We do career exploration. And we do a college readiness thing. You know, getting ready for Washtenaw. And so, and then there are, what we were doing too, during the summer intensive too, is we were doing breakout rooms where we were having a lot of interactions. So, RD (an invited instructor), you know, he does a really good job with these STEM Scholars. And it gets pretty emotional in there, and they get at some deep topics.
>
> And he really gets them talking. And that's true with a few other of our instructors too. Like they really help students to start really thinking about things, you know? And it's funny, too, because you have some older and some younger. So, you have the wisdom of the older ones helping some of these younger ones. And that's something we see a lot, is this growing up that happens with some of the younger ones.

So, in fact, what we were noticing during the lunch portion of the L&L sessions was the continuation and sustaining of a close-knit community formed during the Summer Intensive.

Another practice that sustained community occurred before the Learn portion of L&L sessions began. This 15-min period for announcements may appear routine and inconsequential, but we found otherwise. During this time, Dentel often announced various reminders about meetings with the academic advisor and success coach, promoted the STEM Scholars tutoring services, and other STEM-related happenings on campus that may be of interest. She often solicited volunteers for outreach events like Super STEAM Saturdays which was intended to engage school-aged children or inviting STEM Scholars to be on panels to promote the program to high schoolers. This was also the time where birthdays were acknowledged and transfer acceptances and internships secured were celebrated.

It is during this time that one of Dentel's strengths is on full display. As she speaks about individual scholars, it is clear she possesses deep knowledge about who the students are as people. She remembers facts about their lives and queries them about family members, pets, and how things are progressing with their employment. This is a quality that is not lost on the students. Cosby once remained at the end of a L&L session to chat with a group of students who decided to remain and hang out. She asked them about what makes the STEM Scholars program special and their ready reaction was two-fold. They touted the importance of the Summer Intensive as the catalyst for the sense of belonging and community they felt. They then quickly suggested that if someone wanted to begin a program with a similar feel and successes as this one, they would need to "clone Susan." They went on to speak about all the qualities that she has that make them feel seen, heard, and supported. This quality was also evident in one of Dentel's responses during the December 2020 interview. As we spoke about the required meetings with the academic adviser and success coach, Dentel said meetings "with me are more informal. Really, it's interesting because, I don't know if it's mom or something or. . .they just like to check in with me." This aspect of the program is often referred to as "The Susan Factor" by Cosby and Sawtelle during research meetings as we discuss the data.

Another prominent indicator of the depth of the community in L&L materializes in moments of vulnerability and personal sharing.[1] During the first semester of observations, Sawtelle noted that students were very open in this setting, sharing their struggles about motivation. Cosby witnessed several similar instances, particularly whole group and small group discussions about overcoming issues with substance abuse, chronic illness, challenges with being neurodivergent, family tragedy, and mental illness. For example, during one of the virtual L&L sessions the topic focused on choices successful students make. Cosby was placed in a Zoom breakout room with a group of students. Once they had completed making their list of choices, Cosby noted that the conversation swiftly shifted to one about dealing with quarantine (due to COVID-19) and how various students in that group were dealing with it. Some complained about how isolating it was and how much it "sucks" not being able to see other people. One student, in particular, shared struggles of experiencing quarantine while also trying to navigate issues of trauma. The other scholars try to be supportive and offer suggestions for dealing with it by going outside and engaging with nature. Cosby noted more about the conversation, but concluded with "they seem really, really comfortable with one another."

Through our observations and interview data, we have documented the social nature of the L&L component of programming for these community college STEM students. Not only were there opportunities to volunteer and participate in other clubs on campus led by many of these same students, but there were aspects of community that bordered on those shared by very close friends or members of a family. These efforts are not trivial. Announcements about clubs and celebrating birthdays may seem unimportant, but they are the very foundation of the social integration that make substantive academic support possible. In short, these aspects of programming should not be dismissed or downplayed for CC students where, for example, there are no residence halls for the facilitation of social integration.

Lunch and Learn (L&L) as a vehicle for the formation of information networks

Though there are aspects of the L&L space that are primarily social and serve to acknowledge and support students as whole people, other aspects of social integration advance connection not only to

one another, but also to the college. That is, L&L serves as a vehicle for access to information networks (Karp et al., 2010). Beyond the purely social, however, we observed the L&L space as a site where social connections lead to integration through the advancing of critical information relevant to student academic success. This information includes knowing those involved in or leading clubs on campus, connecting with those with knowledge about various courses or instructors, and contacts with other college personnel with pertinent information about college resources.

Several STEM Scholars were school leaders or heavily involved in other capacities in the college. One student led a Spanish immersion club and another did fundraising for the Helping Hands Club. Across several semesters, there are announcements in L&L for the Science club, Students for Sustainability, the PTK Honors Society, a 3D modeling club, and the Transfer To Success (TTS) club. In fact, one of the STEM Scholars was the president of the TTS club and, upon his transfer, the club would need a new president so he strongly encouraged others to join and participate. Though these club affiliations may seem tangential and inconsequential, the STEM Scholars that are involved have additional information about the college with connections to various scholarships, funding, and other opportunities that could advance their transfer or career aspirations. The situated talk in L&L about activities that students do outside of academics in this setting provides ample opportunity for academic and social integration.

During the informal lunch portion of L&L, we also observed the formation of information networks that supported academic success through talk of tutoring, courses, and navigating the classrooms of specific instructors. Many students made connections with those in the current cohort, but also those from other cohorts to gain tutoring support for different classes. Students often had one or more fellow scholars in their classes which helped to encourage group studies and to hold one another accountable for keeping up with the class. Additionally, the STEM Scholars program has its own tutoring component which Dentel often referred to. During one of the first sessions, she handed out a schedule of the tutoring times for different classes for which many senior STEM Scholars are the tutors. Beyond formal tutoring, however, we also observed several times when students would reach out to other STEM Scholars for tutoring support. For example, in October 2019, Sawtelle noted "One student says to another, "will you tutor me?" He responds, "Any time after Tuesday" and then they arrange it.

In another instance during a session in the spring of 2020, Cosby noted that one of the students leveraged his information network by starting a conversation with a student who is often much less social than others. The two spoke about a class which she had already taken and which he was currently enrolled in. They discussed instructor expectations, grading practices and how some instructors are harsher than others, and the importance of making personal connections with professors as it opens up opportunities for learning and extensions on assignments when necessary. Some students also use the informal Lunch time to continue studying, sometimes together – several days in our observations students are sharing notes and talking about tests.

Dentel also played a role in the STEM Scholars information networks. Though she may not be able to talk as openly about her colleagues' grading practices, she was available to provide students with assistance on the transfer process and offer needed advice. On one occasion, Cosby witnessed Dentel helping a student make edits to an essay she had written to accompany her college transfer applications. The L&L space provided the opportunity for the two to chat, make edits, and eat together for a few minutes during lunch. Unfortunately, with the onset of the pandemic, it was much more difficult to observe these kinds of interactions. Perhaps they could have continued through private chat messages during Zoom L&L sessions or through the Discord group that one of the students set up (and announced often) to keep the STEM Scholars connected during the pandemic and virtual learning.

We also found that L&L increased the potential for building students' information networks in other ways through the strategic introduction of community college and nearby 4-year university faculty. This included sessions on imposter syndrome with Dr. Montgomery from the University of Michigan, a session with the WCC librarian to familiarize students with all the services available to them and how to access them during the COVID-19 pandemic, and a session with the Program

Development Manager on career transitions and the services offered at WCC. As with peers within an information network, each of these faculty and staff members provided information on the functioning of the community college and even the university relevant to their success. They each provided students with their contact information and welcomed continued interaction beyond the L&L session. Notably, there was a purposeful invitation of university faculty members helping the STEM Scholars to recognize that not only are there people here at the community college to support them, but there will be others awaiting them at the university upon transfer.

Lunch and Learn (L&L) as a source of psychosocial development for STEM students

There are ways that L&L functioned as purely social and others in which social connection created the potential for academic integration via students' information networks. We also found that student self-efficacy as science students and identities as STEM people (Bandura, 1977; Kim et al., 2018) were supported through both social and academic experiences during L&L. The lunch portion of L&L allowed for authentic sharing with other friends who loved to engage in STEM activities. The social moments that arose supporting STEM identity were mostly initiated by students and happened organically. When in person, a short academic period (i.e., the Learn portion) focused on academic and motivational supports (i.e., test-taking strategies, time management, critical thinking skills) would follow lunch and this was also a time when students developed STEM student self-efficacy.

Sawtelle's fieldnotes from the fall 2019 semester clearly indicate moments where students are talking about how particular strategies could help them in their classes as they reflected on how various instructors have certain ways of constructing tests. During one of the lessons, students were given different science passages and note-taking strategies. They were asked to figure out which strategy would work best for each passage. Initially, some did not genuinely engage with the task. They simply started "playing school" by trying to find the correct matches or by dividing up the work to just finish the task. However, as the activity went on there was a shift in engagement. Sawtelle overheard students comment on how one of the strategies was different than what they usually did, or how another strategy would be particularly good for chemistry where you must memorize content. This clear reflection on their experiences, combined with the opportunity to see improvement on a specific task has the potential to serve as a source of science self-efficacy (Tschannen-Moran & Johnson, 2011).

Cosby observed instances like ones noted by Sawtelle, but also recorded identity building moments supported by the more social Lunch portion of L&L. These moments demonstrated how individuals see themselves and are accepted as STEM people through their practices, namely engagement with STEM and with one another. For instance, during one of the spring 2020 sessions, a student brought in an electric car with sensors that he had assembled using parts that he purchased from online and invited others to play with it. This event generated significant interest and conversation among the STEM Scholars. On another occasion, a different student brought in a pair of high-tech goggles that he built that allows one to see behind them without turning their head. Several students asked questions about how they worked, what programming was needed, and many including Cosby and Dentel had the opportunity to try them. In both instances, these students engaged in STEM practices of tinkering and engineering and shared those practices and conversations around them with others openly in the L&L space. Once while eating lunch, Dentel, Cosby, and one student had a conversation about his intent to major in mathematics and his career aspirations. Dentel connected Cosby with the student because she knew Cosby had a bachelor's in mathematics and they readily engaged in a conversation around the rigors of pursuing a bachelor's in mathematics and the possible career paths. Another girl was sitting nearby and Cosby asked if she wanted to study mathematics as well. When she said she was more interested in biology, the student interested in majoring in mathematics started talking with her about considering mathematical biology. This serves as yet another instance of how STEM Scholars see themselves and one another as interested in and capable of pursuing STEM degrees and readily engage one another in the many possibilities STEM presents (Carlone & Johnson, 2007; Hazari et al., 2010).

One of the most prominent (with regards to the amount of time and attention it commanded) episodes showcasing the space as one where students could just be STEM people was prompted by one student challenging the group to derive the quadratic formula (see Figure 1). At one point, the entire group of STEM Scholars including Dentel and Cosby were enthralled watching different students attempt to do so. While some made comments about not being able to do it, there was still plenty of engagement and interest. It lingered on for approximately 20 min even taking a great deal of time away from the day's Learn activity. This is evidence of a moment when the social aspects of L&L were privileged and leveraged in service of the recognition for and the development of STEM identities as students engaged in public displays of mathematics knowledge production (Ball & Bass, 2000).

These instances continued, though altered, when L&L went virtual due to the COVID-19 pandemic. As one of the first virtual L&L sessions began, Dentel challenged the "STEM geniuses" (her words) to science trivia which they enthusiastically engaged in making numerous comments in the chat about the trivia questions. During another session, Dentel invited guest professors to give mini-lectures on a STEM topic and its relationship to COVID-19. Though these sessions were not as well attended, those who were present remained engaged and asked thoughtful questions. These sessions demonstrated both how the L&L environment was a source of STEM student identity building and continued to strengthen the students' information networks. Overall, the space is one that is rich with much discussion about STEM topics with regards to being successful in courses, but also was a space that welcomed and promoted engagement with informal STEM conversations. There was a sense of wonder, awe, and intellectual curiosity expressed through active engagement, participation, and comments made either verbally or in the chat during virtual sessions.

During fall 2020, when all of L&L was held virtually due to the COVID-19 pandemic, evidence of identity development and STEM student self-efficacy shifted in notable ways. There was no longer an opportunity to play with electric cars or rearview goggles. Instead, the students needed to be more verbal about the kinds of activities they engaged in that positioned them as both STEM learners or people. That sense of wonder, awe, and intellectual curiosity around science continued to be expressed in the virtual setting during the Fall 2020 semester, but there were not as many discussions around ways to strategically navigate learning science and mathematics virtually. More than anything, the student-led conversation shifted to ways to be involved in STEM or that demonstrated interest in STEM that were separate from being a science or STEM student.

There are distinct moments across the semester where there is evidence of students either being recognized by others or making statements that identify themselves as STEM people. For example, during a September 2020 session, Dentel positioned one student as a very capable science and math

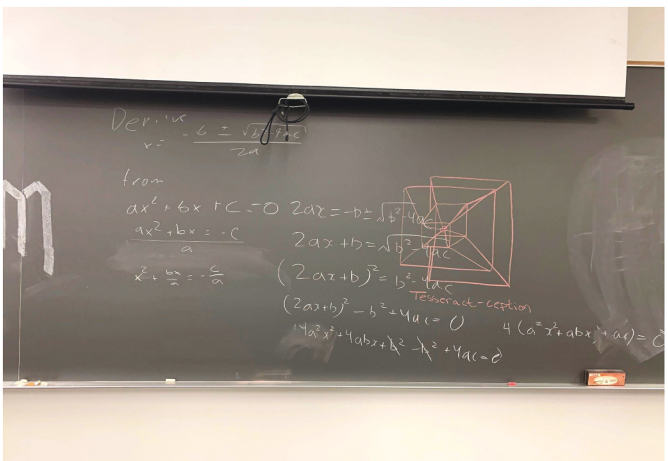

Figure 1. A photo of the chalkboard after students completed attempts at deriving the quadratic formula.

tutor with valuable STEM expertise. She mentioned how he is taking differential equations this semester and can tutor others through Calc III as well as all levels of physics and chemistry. In this same session, two others announced that they were forming a 3D modeling club and asked others if they would be interested in joining via Discord. In these instances, the first student was publicly recognized as a science person while the other two communicated their interest in forming a 3D modeling club. These public conversations also allowed for the students to be recognized as science people with deep interest outside of academic pursuits.

During virtual L&L students continued to wholeheartedly embrace being science or STEM people as evidenced by the kinds of conversations that naturally developed. Mid-October 2020, two students announced that their birthdays were coming up. After wishing them both Happy Birthday both verbally and in the Zoom chat, the conversation quickly turned to how to send celebratory chocolate to the two of them virtually as well as futuristic talk of how one might be able to download chocolate or use 3D chocolate printers.

Another instance in which the conversation turned STEM was during a session about time management and navigating being a student during the COVID-19 pandemic. While in small groups (Zoom breakout rooms), the conversation around time management had died down just as it was announced that there were eight more minutes remaining for discussion. One student expressed that there was nothing more to be said while another said he could no longer talk about time management but could talk about climate change for hours on end. This led to a rich and spirited discussion about environmental science, capitalism, and solving societal problems. It culminated with two students expressing the connection between motivation and interest in a topic and the ease of time management.

Discussion & conclusion

We launched this exploratory study to examine what was happening in the Lunch and Learn (L&L) space and to understand how it aligned with current literature about CC STEM student persistence and retention. Previous literature significantly downplayed the role of social integration for successful CC student retention (Halpin, 1990; Mutter, 1992; Pascarella & Chapman, 1983). While Deil-Amen (2011) and Karp et al. (2010) disputed this notion arguing that social integration does matter, much of their evidence is from interview data and post hoc accounts of student experiences. Deil-Amen (2011) noted that there is little to no research conceptualizing and operationalizing integration and few studies that identify how or where integration occurs for students attending nonresidential colleges. Our ethnographic approach allowed not only for a confirmation of what these authors put forth, but also with added texture and nuance. As Deil-Amen (2011) found, students perceived that close links to institutional actors or agents were responsible, in large part, for their social integration. We were able to distinguish between various kinds of information networks and witness both the organic and more programmatic ways these networks are developed as well as whether these networks were potentially supported by institutional actors or by fellow STEM students.

We found that, in the L&L context, there are purely social moments that support CC students' connection to the school and sense of belonging. While, at times, we found some gradation where it is difficult to distinguish between purely social and purely academic moments of integration, the presence of purely social moments was undeniable. This solidified for us that social integration does matter for CC students and that it can be very intentionally cultivated in classroom adjacent CC spaces Our findings suggest that CCs would benefit from investing in programs like L&L and the STEM Scholars program that intentionally aim to foster such moments. Additionally, we found that, similar to Deil-Amen (2011), L&L was a space that offered an adaptation of Tinto's (2010) theory. However, while Deil-Amen (2011) found that academic integration (in the classroom) could lead to social integration, we found the opposite – that social integration could lead to academic integration through the function of information networks. Finally, we bear witness to and document connections between social integration and the emergence of STEM student self-efficacy and identity formation.

Connections such as these are usually reserved for academic integration, yet we saw them emerge in social interactions. Our findings indicate that both social integration in an informal space cultivated for CC STEM students (Lunch) and the slightly more formal space (Learn) was leveraged in the development of STEM self-efficacy and identity development.

Because L&L exists in tandem with other components of the STEM Scholars programming, we posit that there were also distinctly academic events that took place, likely outside of the L&L space in connection with professors, academic advisors, and tutors. Unfortunately, though there are glimpses in the data that suggest this, it is a limitation of this study to make claims about the interaction of components of the program. We do not wish to downplay the importance of these aspects of the STEM Scholars program. What we do wish to offer, however, is a discussion around the importance of a space like L&L, the role that it plays in social and academic integration, and attention to psychosocial development for transfer-intending STEM students. As a result of this study, we would offer that the interaction between social and academic integration is varied and shifts within and across contexts. This is an important aspect of the CC experience to note for those supporting students in the classroom, those seeking to design similar programs in other CC spaces, and those at the university receiving transfer students (Townsend & Wilson, 2006).

This work has implications for how classroom adjacent STEM programs could be structured in ways that support persistence and retention. Though L&L is only one aspect of the program, it provides insights into the critical role of social integration and how it could be fostered for CC STEM students. What is missing in this, and other literature, is attention to how social integration is experienced for sub-groups of students whether it be disaggregated by major or by social categories such as race, gender, class, or ability status. As we know, community college student populations are immensely diverse. While we do have demographic data for the L&L students, we did not expressly attend to social categories in this study. What is encouraging, however, is that we observed many of these social and socio-academic moments occur across differences though our documentation of such was not our primary priority. This area is ripe with possibility for future research as we both seek to support diverse CC populations and diversify the pool of students pursuing and attaining degrees in biology and life sciences.

In closing, we would like to emphasize that one of the reasons a program like this and research of this sort is possible is due to the community college – university partnership established between Washtenaw Community College and Michigan State University where the CC partner has a question about how their programming functions and the university partner has the resources to gather and analyze data around this programming and offer insights about how it is functioning to serve the CC students. We hope that support for successful student transfer continues in ways that sustain personnel, funding, and these community college–university partnerships. Through this collaboration, we were able to offer one fine-grained example of how various forms of social integration within this classroom adjacent program form and function. Since CC students spend less time on campus than their university counterparts and have more (or different) demands on their time, those connections and interactions that they do have when on campus must be impactful. But just how does that impact develop? There remain many questions about the substance of these socio-academic moments and information networks such as how prominent or salient they are. This would provide insight into whether they serendipitously happen or are directly connected to programmatics in very intentional ways. We might also examine the function of information networks and connections with institutional actors versus other students. Again, knowing this could provide insights into the structure of the program in ways that support programming for maximum impact. There are also many other aspects of the STEM Scholars program that work in tandem with the L&L environment in an intricate system to support these students. We can also offer that such moments are necessary, but insufficient alone to support successful CC completion and STEM transfer. As we move forward, we hope that others will take up the mantle in helping us explore these meaningful questions so that we can continue to strengthen the education we are able to offer a group of students critical to the future STEM fields.

Note

1. Vulnerability is a topic often not written about in the context of postsecondary learning spaces. In this context, we position its presence as both a process and product of community building and sustenance for the L&L space that usually took place during the Learn portion of L&L.

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ORCID

Missy Cosby http://orcid.org/0000-0002-9187-033X

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