Undergraduate STEM Students Social and Emotional Learning through Mentoring in a STEM Youth Program

Sumire Nakamura

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Leslie Rupert Herrenkohl

Katie Headrick Taylor

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Abstract

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Sumire Nakamura

Chair of the Supervisory Committee:

Leslie Rupert Herrenkohl

College of Education

The purpose of this paper is to delineate how mentor-mentee relationship building processes within a STEM youth mentoring program called STUDIO: Build Our World, are supported by particular social and emotional learning (SEL) skills. STUDIO: Build Our World is an afterschool program that supports low income, immigrant, and refugee youth to build interest, motivation, and identification with STEM subjects and to learn more about STEM college and careers. This paper presents a handbook as one of the resources for the new mentors to build capacity in SEL and to understand various mentoring scenarios as they enter the STUDIO program. In addition, a synthetic review of the literature on STEM youth mentoring programs reveals the limited research on mentors' learning processes and SEL. Therefore, this study aims to contribute to this research gap and examines the mentors' narratives to highlight how mentors are engaging in SEL through their interactions with youth.

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Educational Inequity in Science, Technology, Engineering and Mathematics (STEM) Fields

Despite the increasing attention on the inequalities in Science, Technology, Engineering, and Mathematics (STEM) education throughout the nation, there is a pattern of underrepresentation for some U.S. ethnic minorities, defined as students from African, Latino, and Native American heritages (Gándara & Maxwell-Jolly, 1999). For example, less than 15 % of undergraduate degrees in engineering, mathematics, and physical science were earned by African American, Latina/o, or American Indian and Alaska Native students (NSF, 2016). Even before these students of color apply for and enter colleges, institutional barriers stemming from lack of opportunities and poor STEM preparation prevent them from pursuing studies in STEM fields (Basu, Calabrese Barton, & Tan, 2011; Moses & Cobb, 2001). Consequently, some students of color face difficulty in receiving guidance for STEM careers and gaining access to resources that will help them prepare for advanced STEM courses.

STEM Youth Mentoring Programs

As a means to challenge educational inequities in STEM fields, there has been strong support for STEM youth mentoring programs (Ortiz, Breton, Duncan-Poitier, Elphick, Groome, Lansing, & Moore, 2015; Samuel & Hughes, 2014; Malik, 2014). Mentoring is a critical strategy that is proved to be beneficial for underrepresented youth in increasing their engagement in STEM fields (Packard & Fortenberry, 2016). Research by Stevens, Andrade, & Page (2016) emphasizes the differences between STEM mentoring and other mentoring forms, noting that the former specifically focuses on engaging and retaining underrepresented students in STEM

careers. In their study of using culturally relevant theoretical frameworks in a STEM mentoring program, Stevens et al. (2016) argue that mentoring relationships alleviate common academic deterrents, including anxiety, insufficient preparation, and distress caused by cultural barriers among minority groups (p. 948).

Within this research landscape on STEM youth mentoring programs, the focus is towards the mentees' STEM content/knowledge and future success in STEM occupations, and not on the mentors. For example, some research literature addresses the impact of STEM youth mentoring programs on youth while little research is done on the mentors (Bergerson & Petersen, 2009; Carpenter, 2015). Furthermore, Kafai, Desai, Peppler, Chiu, & Moya (2008) address a feature of an effective mentor-mentee relationship as "equitable and reciprocal" between mentors and mentees, positioning both as learners and teachers (p. 192). They critique the traditional mentoring practices, which situate the mentors and youth in a hierarchical relationship, imposing deficit views onto mentees. Instead, Kafai et al. (2008) place mentors into a learner role to expand on the continuum of mentoring and establish a "mentoring partnership" between the mentors and mentees (p. 193). Such study calls for further examination on STEM youth mentoring program impact on the part of the mentors that contribute to such mentor-mentee relationship. Therefore, it is important to unpack the process of how mentors are learning to build relationships with their mentees particularly in STEM youth mentoring settings.

Undergraduate STEM Mentors and Social and Emotional Learning (SEL)

Despite limited research on the challenges in STEM youth mentoring programs, STUDIO: Build Our World is a noteworthy example. STUDIO operates with the objective of supporting low income, immigrant, and refugee youth to build interest, motivation, and

identification with STEM subjects and to learn more about STEM college and careers. STUDIO mentors come from various STEM majors at the University of Washington who are passionate to serve their community. This program is unique in its focus on relationship-building between the youth and mentors, which require the mentors to engage in SEL skills. The term SEL is used to describe a range of cognitive, affective, and behavioral competencies believed to be salient to students' social and emotional competencies, academic performance, and life outcomes (Brackett, Elbertson, & Rivers, 2015). Research led by The Collaborative for Academic Social and Emotional Learning (CASEL) conceptualizes five core competencies, which includes self-awareness; self-management; social awareness; relationship skills; and responsible decision-making (2013).

Structure of Paper

This paper consists of three main sections. The first section outlines the handbook itself and its course of development. Starting from how the need for a formal resource to support new mentors emerged, various sections of the handbook are elaborated. The design and layout aspects of the handbook are also addressed, highlighting the collaboration with a student volunteer majoring in the Human Centered Design and Engineering program at the University of Washington. In addition, the timeline of creating the mentor handbook is presented, specifying different phases of developing and testing the draft of the handbook. The second section investigates relevant literature on STEM youth mentoring programs, delineating various study populations, program approaches, and research findings. Finally, a narrative analysis presents how mentors engage in SEL while participating in the STUDIO: Build Our World program.

STUDIO: Build Our World

STUDIO: Build Our World was established with the mission to change the face of STEM professions and to address critical issues related to accessing STEM education and careers. The program is operated by the STUDIO research and planning team consisting of the faculty advisor, lead mentors, and graduate research assistants while collaborating with a multi-service community-based organization (Meixi, Hill, & Herrenkohl, 2015). Partnering with this organization, which serves as the local platform of educational and social services for various neighborhoods, helped connect youths' interests with their family and cultural communities. In addition, STUDIO experiences are created, facilitated, and supported by STEM undergraduate mentors who understand what the youth bring to the space, where the youth are from, and their interests. In this way, mentors are catalysts who work toward educational equity so that all youth have access to STEM education by offering every youth the support they need to seek further STEM learning opportunities. However, helping the youth see the "STEM in Them" and developing sustained mentoring relationships to support youth are not easy tasks and require the mentors to be equipped with SEL skills. In response to the need to prepare the new mentors for situations to build relationships with the youth, a mentor handbook was created as a tool to generate capacities for SEL.

PART Ⅰ: Handbook and Creating Process

Background of the handbook

STUDIO is offered as an undergraduate course for STEM students at the University of Washington and has relied on word of mouth to recruit new mentors. Typically, new mentors hear about this course through current mentors, who happen to be their friends, peers, or

acquaintances. Therefore, prior knowledge and expectations of the new mentors about this mentoring program vary depending on how much information the current mentors share with them. Historically, the STUDIO research and planning team has observed new mentors having expectations that align with a "tutoring program." However, after a couple weeks into the program, the mentors realize that STUDIO is an entirely different mentoring program. As the program values building sustained relationships with the youth and requires mentors to continue at least for two quarters, the team wanted to facilitate new mentors' understanding of their responsibilities and a steady onboarding process. In response, the team decided to create a formal resource for new mentors in which they can understand their roles, responsibilities, and expectations at STUDIO. The recurring theme of this new resource was being able to provide typical scenarios with the youth so that the new mentors can understand and approach the mentees. After discussing a suitable format for the new resource, the team settled to the idea of a handbook as an useful tool to orient the new mentors to STUDIO.

Sections

Objective. The objective of the handbook is introduced in the first page, allowing the new mentors to first explore what "mentor" means to them. This section was created with an intention to assist the new mentors to reflect on their own experiences with mentoring as they enter this new experience. We wanted to make sure that the handbook existed to help the new mentors explore their own perspective and style of mentoring, rather to impose the "right way" to respond to and support youth in various situations. In order to invite the mentors to actively think about this matter, this section embeds a "Pause and Reflect" column, in which mentors respond to the prompt, "What would you like to bring to the table?"

Mission and core principles. These sections were written up in order to help the new mentors understand the bigger picture of STUDIO: the purpose and goals. The explanations are intended to describe why programs like STUDIO are needed, especially addressing the systemic and structural barriers that limit low-income and underrepresented youth's participation in STEM learning opportunities. This section also calls for a new perspective and challenges the deficit-oriented viewpoint, which assumes that youth are "behind" and lack a strong foundation for STEM learning. Examples of core principles are "provide innovative project-based and making and tinkering activities that sit at the intersection of youth interest and mentor expertise to support youths in further developing their STEM interests and identities," and "work towards educational equity so that all students have access to STEM education" (Basu & Barton, 2007; Martin, 2015; Vossoughi & Bevan, 2014).

Philosophy. In this section, three pillars of STUDIO concepts are presented: relationship building; community of learners; and experiential learning. These values orchestrate how the mentors interact with each other and the youth and work toward their goals. STUDIO not only brings STEM expertise to the program, but also establishes relationships across and within the youths, mentors, and staff. This aspect is critical especially when the goal is to expand the youth's futures in STEM education and careers by connecting their interests and motivations to program activities. Mentors are encouraged to communicate their personal, cultural, STEM and college experiences with the youth through a reciprocal relationship. Another pillar of STUDIO is community of learners, in which mentors are united in addressing educational and systemic inequities in STEM and supporting youth through mentoring. Challenging the status quo requires a collaborative effort, thus it is essential to create a community where students and educators are

actively co-constructing knowledge together (Cole & Consortium, 2006, p. 111). Finally, acknowledging that mentoring youth could produce some challenges, experiential learning is valued in improving mentoring practices. STUDIO offers a informal learning environment where mentors and youth can experiment with various styles of learning, thus this paragraph emphasizes the importance of trial and error. In such way, this pillar assists the mentors to understand that they are always in the process of learning and improving their practices.

Expectations. STUDIO requires the mentors to follow through certain expectations in a way to sustain programming while finding best ways to support the mentors. Following through the principles, mentors are asked to actively participate, bring expertise to making and tinkering, be flexible, seek support, reflect, and work across differences.

The mentors. STUDIO would not have existed without the diversity of mentors' experiences, backgrounds, motivations, and interests, etc. This section provides the various faces of mentors during the mentoring experiences including their self-perceptions as mentors, roles, and identities. In order to prevent mentors from having static ideas about who mentors are, this page exposes new mentors to various narratives from previous mentors and helps them explore their possible mentor identities. The Mentor Stories section were created from weekly mentor self-reflection documents and are used with their permission. Examples include how one mentor realized that their role as a mentor is not only about focusing on scientific concepts of key points of biology, but also about understanding how the youth want to learn or what encourages them to become curious about a topic. In another narrative, a mentor highlights how mentoring and teaching are two different ways of interacting with youth and identifies himself as a near peer rather than a lecturer.

Weekly schedule. This page was created to provide the mentors the weekly STUDIO schedule. Due to the partnership with non-profit organization and its program schedule, mentors can choose to go to its community center on the afternoons of either Tuesdays or Wednesdays to mentor the youth. On Fridays, mentors attend an hour-long seminar where they debrief their mentoring experiences, discuss important topics such as identity and educational inequalities, and address logistical issues surrounding the implementation of programming. This page also describes the mentors' weekly self-reflection assignments. Mentors are required to submit a free-write on their mentoring experiences including interesting interactions, challenges, breakthroughs, and new ideas. Every week, mentors are given specific prompts to ponder over and write up their reflections.

An average day. This page covers most logistical sides of STUDIO such as how to get to, what to bring to, and what activities are held at the mentoring site. For both Tuesdays and Wednesdays, mentors meet at a parking lot at the university in order to drive down together to a community center in High Point. Although all the materials used in the activities are prepared from the side of the community center, mentors are encouraged to wear their university attire as to inspire conversations with youth around college preparation. The "Making & Tinkering" section delineates the typical schedule of curriculum throughout the quarter. The first 3 weeks are dedicated to one-off projects, in which mentors and mentees work together to solve problems and learn more about each other. The remaining 6 weeks are dedicated to curriculum that has a theme and produces a final project that is shared at showcase where everyone involved in STUDIO come together and celebrate their accomplishments and projects.

Leadership opportunities. This section was created with the intention to inform the mentors about leadership opportunities at STUDIO. In our explanation, we emphasize that all mentors who join STUDIO are already displaying their leadership by serving and learning together in their community. The nature of programming allows mentors with more knowledge and experience in STUDIO than new mentors to take on initiative in leading the group of mentors. One of the opportunities is to become a lead mentor, who helps organize mentor recruitment, classroom discussions, transportation and logistics, and communication with the staff at Neighborhood House. New mentors are able to become lead mentors after they joined STUDIO at least a year.

Another leadership opportunity is to develop a 6-weeks curriculum based on their expertise and knowledge in STEM and youth interests. This is a great gateway for mentors to apply their scientific knowledge obtained through traditional classrooms to informal learning environments. As STUDIO's mission is to help youth build interest, motivation, and identification with STEM subjects, the process of curriculum development requires mentors to pay close attention to what that youth are interested in learning each quarter. In order to help mentors imagine the process better, a timeline for curriculum development is presented with dates including a set of workshops led by a graduate student, and the start day of implementing the curriculum. Mentors are allowed to start building curriculum after they have participated in STUDIO for at least a quarter. This period helps situate the mentors better in understanding how STUDIO works and what youth are interested in learning.

Mentor stories. The bulk of the handbook is dedicated to informing the mentors about the various narratives past mentors had during their interactions with the youth. Often times,

mentors come into the space of mentoring with questions such as, “what should I do when youth seem disengaged?”, “what do I need to do in order to build interest in the youth?” As these common questions resurfaced throughout the STUDIO experience, we noticed the need to address the feelings that especially new mentors may have in uncertain and unexpected circumstances. Therefore, the mentors’ stories were shared so that the new mentors can explore how past mentors address and overcome challenging moments in engaging with youth. Narratives are made up of rich description about how a mentor identified an issue and what he/she felt about and did to resolve it. In order to highlight the challenges and strategies, we followed a certain format for each story with an one-sentence statement accompanied with the narratives.

Reflecting questions. As much as the handbook is intended to provide enough information in regards to STUDIO’s mission, principles, expectations, and mentors’ stories, we also wanted to situate the handbook as a reflective tool for the mentors. In hopes of having the mentors constantly revisit and relearn from this handbook, three reflection prompts were laid out: “what personal, cultural, and STEM identities do I bring with me to this work?”, “how can I help youth make meaning in their learning experiences?”, and “what makes a great STEM mentor and role model?” In the description of this page, we have encouraged the mentors to come back to their answers after a quarter or two so that they can see their own growth through their responses.

Layout

In order to make a mentor-friendly handbook, I sought help on the design of the handbook from Daniel, an undergraduate student majoring in the Human Centered Design and Engineering. As his main role was to research handbook examples and layouts, he actively

shared his knowledge and expertise in designing the handbook. Utilizing his knowledge on the human-centered design process, the handbook was informed by the following design principles: make the information easily digestible; understand what the users want and need through feedback and empathy; establish key design requirements and create a list of design needs. As the intended audience were new STUDIO mentors, the handbook was created to have a welcoming tone by incorporating various photos and icons.

Design Needs

Drawing on principles and concepts from the Human Centered Design and Engineering discipline, we ensured that the handbook was user-friendly. As our intended users were new undergraduate mentors, we reduced academic jargon to everyday language, which is more accessible to the undergraduate students. The language in the handbook was written as if writing to a friend, aiming to evoke a sense of familiarity among the new mentors, as well as appealing to the importance of their new role in serving the community. In addition to prior knowledge of design needs, Daniel conducted research on various handbooks and found that such materials are created in a way that instills feelings of importance and a sense of belonging in the mentors. Furthermore, we also realized the need to provide concise information to ensure that we valued the mentors' time as they are usually proactive and busy fulfilling their responsibilities as undergraduate students outside of STUDIO.

Schedule

Phase one: The draft of handbook. The idea of creating a handbook originated from a meeting with the STUDIO research and planning team in mid February, 2017. The discussion of the programmatic needs in supporting mentors in engaging with youth guided us to formulate the

idea of the handbook as a new resource for the new mentors who join the program. This idea fell into one of my research projects, which supported my graduate studies on the intersection of mentoring, relationship-building, and SEL. From April, 2017, I created an overview of the handbook taking into account that this tool is to support the new mentors' understanding of STUDIO's mission and on various mentoring scenarios, and to generate SEL skills. After expanding the overview, the first draft of the handbook was shared via Google docs with the STUDIO research and planning team in May, 2017. The team offered feedback and helped edit the draft. In June, 2017, As the content of handbook was developing, Daniel and I had our first meeting on the direction of the design of the handbook. During our first meeting, we discussed what the end product will look like, the overall timeline for creating the handbook, and our roles. The meeting also covered topics such as interviewing the current mentors to understand where and how they gained access to information on STUDIO and the new mentors to understand what type of information they seek in joining STUDIO.

In July, 2017, the content and design were continuously updated. In addition, Daniel transferred the content data from Google docs to Apple Pages as the latter supported various design features like the layout, spacing, and icons. As Daniel also conducted research on handbooks from various companies, a common design concept emerged to inform us to evoke an emotion by imposing motivational mindsets on the mentors. In regards to our handbook, we thought about the emotions, values, testimonials, the reasons for being invested in STUDIO and wanted to share them with the new mentors. As August approached, we crafted our sentences to show that the mentors' work really matters, complimenting their interest in mentoring. We also organized the sections while taking into consideration what the new mentors would want to read

first. Another concern was that given the amount of information, we were not sure whether the dense description will enable the mentors to retain all the written information, thus helped frame and condense long paragraphs. While both the design and content were bidirectionally influencing each other in the development of the handbook, Daniel started to explore visual resources pertinent to STUDIO, such as icons and colors to apply to the overall design of the handbook. We also reached out to the marketing and communications department in the College of Education at the University of Washington so that we can align our fonts to the University's typography. The department directed us to the relevant website, in which we had access to the typography and downloaded the University's fonts to use in our handbook.

Phase two: Testing at 2017 STUDIO mentor orientation. The draft of the handbook was considered as the beta version to test at the orientation for the new mentors in late September, 2017 right before the new academic year began. The purpose of the four-hour long orientation was to help familiarize the new mentors with the purpose and values of STUDIO, to complete necessary paperwork and background check forms, to invite them to learn about the types of STEM learning activities, and to build relationships with the continuing mentors. Physical copies of the handbook were provided at the beginning of orientation and the orientation was organized in a way to echo sections of the handbook.

In October, right after the orientation, interviews with both new and returning mentors were conducted in order to obtain feedback on the beta version of the handbook. The new and returning mentors were given different interview questions because we believed that returning mentors already had ideas around expectations and navigating youth mentoring while new mentors would inform us about how they would initially obtain information needed to mentor

youth (See appendices). While the interview protocol for new mentors contained questions around their frequency of using the handbook and feelings after receiving the handbook, the returning mentors were asked about their experiences so far as a mentor and their process of obtaining necessary and salient information to be the best mentor they could be. Common questions prompted both the new and returning mentors to describe what was missing and points for improvement in the handbook. Interview results helped us tweak some wordings and design aspects as well as understand that mentors wanted the handbook to include concise and organized information about class times, transportations logistics, leadership opportunities, and youth responses.

Debriefing the interview results, Daniel and I identified the need to create additional pages which provide information on an average day for mentors, commute logistics, and youth responses to the mentors. Thus, supplemental pages were created to appreciate the mentors' participation in STUDIO and to depict how and where to meet on the day of mentoring, along with a campus map to highlight the meeting spot. After going through iterations of continuous revisions, the handbook was completed in mid November, 2017.

Final product: Applications.

Mentor recruitment. Students first hear about STUDIO through either word of mouth or email listservs sent out to various departments and academic advisors across campus. In addition, flyers with a brief statement about STUDIO and course information are posted on bulletin boards around campus. Although there is no official mentor recruitment process, interested undergraduate students typically reach out to the faculty advisor or graduate research assistants for more information and set up an appointment. In order to

familiarize the students who express interest in STUDIO, the graduate research assistants meet with them and go over the handbook to elaborate on important information about STUDIO. Covering each page of the handbook, this meeting includes topics such as program features, mentor responsibilities and invites the students to ask questions.

Orientation planning. In the beginning of the new academic year, STUDIO asks all registered mentors to participate in a mandatory orientation before they embark on their mentoring journey. Orientations help situate the new mentors to learn more in depth about the work in STUDIO, complete necessary paperwork and background check forms, and promote relationship building between the new and returning mentors. The 2017 orientation was particularly structured based on the handbook: starting off with introduction of the team; sharing the mission, core principles, and philosophy as described in the handbook; and introducing mentor voices. In order to elicit a clear and authentic version of the mentor stories, the research and planning team hosted a panel discussion session where they invited returning mentors to share their stories about challenging and rewarding mentoring experiences with the youth. Questions for the panel included: Why did you become a STUDIO mentor? What was the most rewarding experience and challenging experience? How did the STUDIO experience impact you?

PART Ⅱ: Relevant Literature

This section works to place STUDIO into a broader context of STEM youth mentoring programs. Drawn from my central research question, I conducted a synthetic review of literature to investigate how available research literature on STEM youth mentoring programs identify features of effective mentoring relationships and mentors' SEL in building relationships with

youth. Relevant research literature included publications on mentoring programs that provided STEM learning activities to adolescents with support from adult mentors. The following section introduces the convergence of primary research findings in relation to two important issues: How does the STEM youth mentoring literature identify features of effective mentoring relationships? How does the STEM youth mentoring literature discuss effective relationship-building processes and the role that mentors SEL skills play in building these relationships? I also present unique contributions of each study. Specifically, information on the program type, participating mentors and youth, relevant practices and activities is presented to underscore the differences among the literature.

Within the nine studies that investigated STEM youth mentoring programs, only four studies addressed roles that mentors take up in mentor-mentee relationships (Clark & Sheridan, 2010; Mondisa & McComb, 2015; Kafai, Desai, Peppler, Chiu, & Moya, 2008; Larose, Cyrenne, Garceau, Brodeur, & Tarabulsy, 2010). Some studies attributed the effective features to the "learner" role of mentors and its influence on developing reciprocal mentor-youth relationships (Mondisa & McComb, 2015; Kafai et al., 2008). In their study on a STEM near peer mentoring program called MIRES (Mentoring for the Integration and Success of Science Students), Larose et al. (2010) investigated the mentoring experiences and behaviors of 24-year-old undergraduate mentors who served freshmen in the sciences and addressed how a mentor's shifting roles alternating between goal-directing and collaborating during activities accounted for effective mentoring relationships (p. 137).

Findings from other studies addressed that STEM youth mentoring programs had several positive impacts on the mentors such as project management skills, teaching preparedness,

career-related skills, and youth engagement skills (Gray & Albert, 2013; Cutucache, Luhr, Nelson, Grandgenett, & Tapprich, 2016; Nelson, Sabel, Forbes, Grandgenett, Tapprich, & Cutucache, 2017; Carpenter, 2015). In particular, in a study on undergraduate science students who joined science education outreach opportunities that serve K-12 students in a high-need school district composed of approximately 35% English language learners and 60% low income students (p. 119), Carpenter (2015) discovered self-reported gains among mentors in communication and collaboration skills, in addition to developed ideas about science teaching and learning, such as understanding the youth and their interests (p. 141). She argues that mentors learn engagement skills such as understanding the students' prior knowledge, adapting their teaching to respond to youth needs, and recognizing their diverse learning preferences and backgrounds through leading small group discussions and presenting or organizing science learning activities (p. 131).

Although some studies address how programs influence the mentors' experiences and abilities, there is a need for further research about the impact of mentoring experiences among the mentors in general. Moreover, most of the studies identify relationship building as essential to mentoring success (Clark & Sheridan, 2010; Mondisa & McComb, 2015; Kafai, Desai, Peppler, Chiu, & Moya, 2008; Larose, Cyrenne, Garceau, Brodeur, & Tarabulsy, 2010). However, few address the SEL skills that mentors draw on while learning to build relationships with mentees in STEM youth mentoring programs. This project seeks to address this gap in the literature by examining the question: how are mentors engaging in SEL while interacting with the youth at STUDIO?

PART Ⅲ: Mentors' Social and Emotional Learning

Theoretical Framework

In order to respond to my research question, this paper draws on SEL as a conceptual framework. SEL is a process that helps "individuals recognize and manage emotions, developing caring and concern for others, establishing positive relationships, making responsible decisions, and handling challenging situations constructively and ethically" (Brackett, Elbertson, & Rivers, 2015, p. 20). The Collaborative for Academic, Social, and Emotional Learning (CASEL) defines core SEL competencies as follows: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (2013) (See Figure 1.1.).

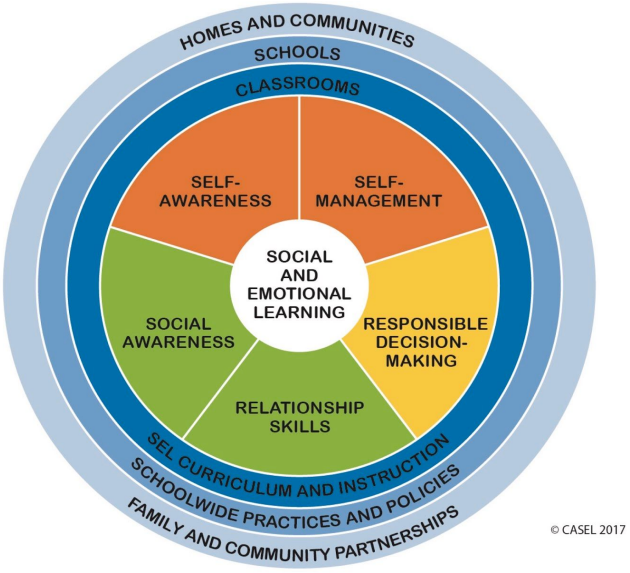

Figure 1.1. *CASEL social and emotional learning competencies*

Self-awareness is the "ability to accurately recognize one's emotions, thoughts, and values and how they influence behavior." This also contains assessing one's strengths and limitations, while having a well-grounded sense of confidence and optimism. Self-management

requires one to successfully regulate one's emotions, thoughts, and behaviors in various situations — effectively managing stress, controlling impulses, motivating oneself and working toward achieving goals. Social awareness constitutes "the ability to empathize with others, including those from diverse backgrounds and cultures." It also pertains to "the ability to understand social and ethical norms for behavior and to recognize family, school, and community resources and supports" (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2015, p. 5). Relationship skills relate to "the ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups." These skills also involve clear communication, active listening, cooperation, resistance of inappropriate social pressure, constructive conflict resolutions, and prosocial skills. Lastly, responsible decision-making encompasses "the ability to make constructive choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms." It also comprises "the realistic evaluation of consequences of various actions, and a consideration of the well-being of oneself and others" (p. 6).

Method

In order to investigate my research question, I analyzed mentors accounts and self reflections to create case studies that highlight SEL for each mentor (Merriam, 2009). The analysis is intended to uncover moments when SEL was important to mentors in constructing mentor-mentee relationships in STUDIO. Considering the nature and goals of qualitative research, it is critical to be conscious of my own positionality as a researcher throughout my studies. Since I am already a member of the STUDIO community as a graduate research

assistant, I made sure to situate myself as a participant observer, which helps me better understand the participants and their behavior (Glesne, 2016).

Data Collection. I collected and analyzed the self-reflection documents completed by each mentor, allowing me to access pertinent data and gather multiple perspective on the mentors' experiences of interacting with their mentees. Every week, the mentors respond to specific prompts in order to reflect on their past experiences and explore various topics by writing up a self-reflection document. Each document is individually submitted to Canvas, an online learning management system, so the mentors can write freely without concerns of sharing it with their peers. On this system, the mentors report feeling safe to disclose their honest and authentic reflections, thus making this a reliable form of data from their perspectives. Prompts address a wide range of topics and are informed by our general themes of educational equity, building relationships, developing relationships, facilitating learning, and creating mentor-led curriculums. Prompt examples are, "What identities do you hold and how do they impact your interactions with the youth?", "Share a highlight of the week and any concerns you have moving forward," "What is one thing you are learning through participating in STUDIO?," and "Describe in detail an important interaction with someone this week."

Data Analysis. This study is derived from the interpretivist paradigm as traced by Glesne (2016). The interpretivist approach was optimal for this research as it assisted me in gaining a better understanding of the mentor's experiences of interacting with the youth. Analyzing the complex mentor-mentee interactions through the mentors' words were critical in understanding the contexts and processes of the mentors' experiences in STUDIO. Since my research question is to uncover the process of STUDIO mentors' engagement in SEL, qualitative methods best

supported me in analyzing in-depth personal accounts and mentor-mentee interactions to present themes around SEL.

Each self-reflection was carefully analyzed with a focus on how mentors are engaged in SEL while interacting with the youth at STUDIO. Among the five interrelated pillars of SEL, self-awareness, self-management, social awareness, relationship skills were most pertinent constructs that were used in this study. As the focus of this study was to unpack the process of mentor-mentee relationships, responsible-decision making was not taken into account.

Findings

Findings include a brief definition of each of the SEL components and self-reflection prompt followed by responses from various mentors pertaining to self-awareness, self-management, social awareness, and relationship skills. These personal accounts reflect the unique experiences of each mentor and capture a range of those experiences pertaining to self-awareness, self-management, social awareness, and relationship skills.

Self-awareness. One of the first components of SEL is self-awareness: the ability to recognize and label one's own feelings and accurately assessing one's strengths and limitations (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2013, p. 9). During the course of mentoring, many undergraduate students expressed that they are aware of their own thoughts and emotions and how they influence their behaviors. In fact, self-reflections are opportunities for mentors to engage in self-awareness as they allow them to reflect on their emotions and thoughts during their participation in STUDIO. Not only do mentors enact self-awareness when they are present with the youth during the program, but also when they are thinking about their experiences outside of STUDIO. When asked about how mentor identities

impact his/her interactions with the youth, Sebastian explains his thoughts about his upbringing and how that influences his behavior towards the youth:

> An identity of mine is that I grew up in a poor, single mother family. My family was reliant on programs like food stamps and free lunch while I was growing up. My family is better off financially now but I will never forget the impact that programs like food stamps had on my life. I have a great appreciation of the potential for social programs to allow people to achieve social mobility. Because of this upbringing, I may be more understanding and empathetic to a youth whose family may be in a similar situation. I might have a better idea of the challenges and struggles in family and school life that comes with having a difficult financial situation.

Sebastian identifies himself as a non-religious Mexican-American male who grew up in low income family. He is aware of how his family benefited from social programs and his emotional experiences during that period. This response reflects how he recognizes his thoughts and feelings of appreciating social programs and how such thoughts influence his "understanding" behavior. Knowing that the youth come from low-income, immigrant, and refugee backgrounds and reside in a public housing community, he is aware of his emotional capacity to empathize with youth who may be living with limited financial resources and relying on social programs too. As indicated by Sebastian's narrative, mentors have a deep understanding of their own thoughts and emotions, which affect how they make meaning in their mentoring experiences and how they relate to youth.

Another mentor, Try explains how he is aware of his background and perspectives on society, as a Vietnamese male who has agnostic views and grew up in a financially well off family:

> I was raised with certain ideals and traditions that I uphold. As an adult, I have my predispositions and views of the world. That doesn't mean every other person will live their lives the way I do. That is why I always try to be aware of the differences between me and the youth, the privileges and the shortcomings I have. We all come from different backgrounds, whether cultural, ethnic, or religious…We are of different age. The youth and I are very much different and the youth among themselves are unique individuals with each of their own identities. When I first joined STUDIO, I was very self-conscious of the way I should behave. I was afraid of not getting my point across to the youth and risk offending/boring them. Because of our differences, it was a process trying to fit in with the youth.

Try's self-reflection exhibits how he is conscious of the uniqueness of each individual youth and mentor. He reflects on his background and perspectives on the world and realizes that dimensions of his experiences such as age, ethnicity, culture, and religion impact his point of view as well as the points of view that youth bring. Acknowledging the differences also guides Try to be aware of his own privileges and limitations or shortcomings he may have in helping youth develop interest and motivation in STEM learning and in building relationships with them. As he starts off the program, Try recounts how we was acutely aware of his behavior being

around the youth. Like other new mentors, he is aware of his desire to have youth like working with him and his concern that he could bore or offend youth. Try's reflections demonstrate a keen self-awareness as he begins his mentoring in STUDIO.

Meanwhile, Art expresses his awareness of the markers of his identity that may or may not intersect with youth and strong values that he wishes the youth to learn from him and his interactions:

> So when I interact with the youth, there are aspects of my culture that are visible such as my skin tone, and aspects that are not such as my religion, and some of the youth are the same as me some are not, and the most important thing to do when interacting with them in my opinion is to show them that there is no right or wrong. There is no good or bad identity and even among people of the same identity there is no good or bad way to display your identity. Someone wearing a hijab is not more Muslim than someone who does not. The important thing to teach the youth in my opinion is acceptance and to live their own lives aware of their identities and aware of the identities of others, but to never be ashamed of their own identities and to never be unaccepting of anyone else's.

Art identifies himself as a middle class Muslim Iranian American male. He is keenly aware of his own identities and how they externally influence youth perceptions or align with youth identities. With these differing identity markers in mind, he asserts the importance of understanding that there is no right answer to or right way of expressing identity. This is especially important in the context of STUDIO where many youth come from East African

Muslim backgrounds, a religious background that Art shares. He's marking here a recognition of the many ways that being Muslim is practiced in different communities and the desire to create an inclusive climate of respect for recognizing all these different ways. Art is aware of his strong value about identity and wishes the youth to learn about acceptance of others and self-awareness. Particularly, he believes that the youth should be proud of their own identities and also respect others' identities. In essence, mentors draw on STUDIO values and bring in their individual values they have accumulated over time to their mentoring practices.

These reflections demonstrate that mentors exhibit self-awareness as part of their participation in the STUDIO community by understanding their self-perceptions, emotions, behaviors, privileges, limitations, and values through their similarities and differences with youth. In practice, journaling self-reflections engage mentors in self-awareness, where they think through their personal lives or experiences with youth and work to make sense of them to improve their mentoring skills and relationships with youth. In response to particular prompts that require reflections on identities, mentors show that they understand their own identities and how they may influences the way they interact with the youth. In addition, they are aware of their values that inform the way they interact with the youth. Therefore, self-awareness is critical in ensuring the mentors learn about themselves while they are learning about the youth.

Self-management. Related to self-awareness is self-management, the ability to regulate emotions, thoughts, and behaviors in different situations. Controlling impulses, managing stress, motivating oneself, and setting and working toward achieving personal and academic goals are all rooted in self-management (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2013, p. 9). Mentoring is a fluid and ever-changing process, which requires flexibility

and adapting to uncertainty. As much as there are support systems within STUDIO to address the needs and interests of mentors and mentees, there are times where mentors face unexpected situations. In response to those challenges, mentors effectively navigate their emotions, thoughts, and behaviors and adapt to various situations. For example, when asked for any concerns about mentoring, Theresa states one of the common challenges of balancing her energy level between various academic and personal commitments:

> One challenge was maintaining my energy. My Wednesdays are very long - starting very early in the morning and cramming a lot of activity in before STUDIO even starts. Lunch was small and on the go. I am going to have to pack a larger lunch and become accustomed to the very long day for the next several weeks to come. It will be a good learning experience and well worth it!

Mentors who take part in STUDIO are often hardworking undergraduate students who juggle multiple responsibilities in and out of school. Some mentors directly join STUDIO after early morning classes and activities. Theresa, being one of those mentors whose weekday academic and personal commitments take up the entire day, is a female Caucasian student who was raised in low-income Catholic family. Even with her busy schedule, she was able to manage her emotions and enjoy on-site mentoring.

Thomas, who identifies as a middle class Christian Chinese American male, presents another case about his concern for a youth who sometimes takes up a lot of the talking space during discussions in the Art in STEM project :

> It was fun to come up with drawings in our groups but I thought that the discussions were a little harder to have because we had to hush some of the students like all the time. It was hard in the sense that we might need to try to come up with a different idea than lecturing and lecture discussion at some parts of the day. I know we want to be intentional with the learning and get the youth to think a certain way but discussion is hard when S ends up being the only one speaking and at times I feel the need to talk to S about waiting for other people to speak, think, and share. I bring up this because S is a bright kid, he reminds me a lot of myself in this aspect of talking a lot. A lot of things that I am trying to work on is holding my mouth and letting others speak and say what is on their mind. Part of a just community is giving up a part of who you are to that community you care about.

Thomas perceives that one of the youth in the group discussion is dominating as he expects that each youth in group should take turns with voicing and sharing thoughts. Projecting himself onto the youth's communication tendency, Thomas recounts his own conversational predispositions and shares that he is putting effort into adjusting his behavior. The interaction with the youth reminds and reinforces Thomas to regulate his communicative behavior by managing his impulse to speak and waiting for others to share. In addition, he's trying to work out how he can effectively make suggestions to all youths - some who need to figure out how to self-monitor their airtime and others who need to encourage themselves to speak up. This is a

very common challenge in many classroom, afterschool, and workplace settings so developing these skills is critical for successful collaborative work.

On the other hand, mentors who develop curriculums adjust their behaviors and work towards their curriculum goals often on a week-by-week basis as they learn more from youth about their interests. For instance, Stacy developed a curriculum aiming to have the youth learn various healthcare and medical professions, but in the first week of curriculum, realized that all the youth in her curriculum group were female except for one male student:

> As I walked in, I saw that all of the members of my team were girls and after a few minutes, H walked in. He was not entirely happy because B had placed him in my group and I already could tell that I had to pay extra attention to him and bring some positivity and excitement. I totally understand his views though because he is the only boy in the group and he may feel like an outsider, but my goal is to excite him about medicine and healthcare and I can't wait to see the progress he makes.

As a Iranian American non-religious female student who grew up in a financially secure family with a Muslim background, Stacy has been curious about gender and race stereotypes in healthcare professions. Having addressed equity issues in healthcare and medical careers, she realized at this point that the nature of the curriculum could have influenced the gender distribution in her group. Other mentors and staff also worried that by allowing youth to self-select into groups we may be recreating gendered stereotypes with girls choose health careers and boys choosing sports science for that session. The entire team started to talk about

this issue and try to find ways to address it but in the meantime, Stacy observed that the male youth seemed disappointed with the gender distribution in his curriculum group. Her account describes her determination and hope in working towards the curriculum goal of inspiring the male youth to be excited about medicine and healthcare. In addition to the curriculum objective, she learns to pay more attention to the male youth as the curriculum unfolds. As Stacy demonstrates, although mentors who develop curricula have initial plans, mentee reactions require them to manage their behaviors to make curricula successful for youth.

Similarly, John, who identifies as an agnostic Taiwanese-American male from a financially secure family, discusses his challenge responding to youth needs while identifying concrete steps to achieve the objective of his curriculum:

> One challenging moment was that 6/8 of the students were not really into the curriculum this week. Therefore, it is imperative for us to find ways to incorporate topics and methods that cater to each individual student's interests. This would be the next challenge besides implementing the Biologically-derived Materials Curriculum. Going along the same lines, I think we also need to look more into ways to get the youth interested in activities, even though we have no idea what is happening in their lives. If the topic was more exciting or presented in a more interesting way, 99.9% of the youth would still be somewhat interested.

Working alongside another mentor to teach biology and material sciences through their curriculum, John reports that most of the youth in his curriculum group did not seem interested

in the curriculum topic for that day. Despite this challenge, John maintains his optimism and actively identifies a resolution of incorporating topics and ways that overlap with youth interests into the activities. Although mentors are given insights about youth interest in general, they often develop a better understanding of the youth through mentoring, thus undertaking iterations of planning and changing the curriculum over the course of the quarter. As such, mentors learn how to adjust the goal and steps of creating an engaging curriculum by purposely connecting mentor expertise in the subject and youth interests.

In accordance to STUDIO's goals, mentors bring their energy to STUDIO, create safe learning environments for all youth, value youth expressions in discussions, reiterate curriculum goal-setting based on mentor expertise and youth interests by practicing self-management. The nonlinear and uncertain characteristics of mentoring and building relationships while creating meaningful STEM learning opportunities for youth require mentors to manage stress, regulate emotions, thoughts, and behaviors, motivate themselves, and set and work toward achieving curriculum goals.

Social awareness. Drawing upon the broader field of social competence is social awareness, which is the ability to take the perspective of and emphasize with others, appreciate diversity, and respect others (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2013, p. 9). STUDIO encompasses socially aware mentors who exercise perspective taking and empathy towards the youth during mentoring and curriculum development. They continuously surface and challenge deficit-oriented assumptions by respecting youth who come from diverse backgrounds and cultures. Through observations or curriculum planning and development, mentors realize that understanding the interests, emotions, and experiences of the

youth are critical in creating a safe and engaging learning environment that embodies the youth's culture and community.

When asked for one thing they are learning through their participation in STUDIO, Jerry states that he learned that "self-confidence plays a key role in learning," observing the growth of two youth:

> Two youth who have really exemplified that this quarter have been Z and K. Both Z and K started out this quarter very reserved and quiet, but slowly through the quarter by learning a base of coding and building some confidence they became much more willing to engage/help other youth who are struggling/ask questions when confused. In doing so, their own learning seemed to skyrocket, and they began learning coding at a much quicker pace than they did to start off with. This is important to me because it shows the really positive impact that learning within a community can have.

Jerry identifies himself as a non-religious white American male who was brought up by a financially secure family. Throughout the quarter, he observes how the two youths transform their participation and engagement towards the project by carefully observing and understanding their growing sense of competence. Jerry was specifically impressed by how these two youth became more confident in the subject as they helped their peers and actively offered their help to other youth. Jerry's anecdote signifies that STUDIO mentors exhibit the ability to take the perspective of and to understand the emotions of the youth through keen observations of how

youth are learning STEM. This ability is also imperative because having a deep understanding of how youth learn can inform approaches to mentoring.

On the other hand, Amy expressed her dilemma of encouraging the youth to stay on-task as in a traditional education setting while respecting the youth to be themselves in an out-of-school learning setting:

> Feeling frustrated when youth are off-task is reasonable. In those moments, though, I forget that the STUDIO space is not to be identical with a classroom space, which is what I am used to – very focused and quiet. When handling these situations, the easy solution I envision would be comparable to a classroom setting. This is why I benefited from what C said at the end of program yesterday: "This space is theirs just as much as it is ours." GCENH and STUDIO are in their community, so it makes sense why they bring their personal lives into the space. Also, the group of young women in Digital Media and Graphic Design are all a part of a seemingly tight-knit friend group. Given this, it should be expected that together, they would occasionally engage in personal interests/happenings more than the activity we propose to them.

In her detailed account, she explains her frustration when the youth are "off-task," expecting them to adopt the ideal behaviors in a traditional classroom environment and be "on-task." As a Japanese American female born to a financially secure Christian family, not only does Amy recall how STUDIO is housed in the community, but also respects the established friendship within the youth group. This understanding of how female friendship is built upon

during the adolescent developmental stage guides Amy to be respectful of how the youth are interacting with each other rather than to push for completing the curriculum activity. As Amy's experience represents, balancing between respecting the youth and encouraging on-task behavior is crucial in the learning space at STUDIO. Every week, arriving at the mentoring site, mentors are reminded of the importance of understanding and respecting where the youth come from and their social needs and cultural norms.

Even long-standing mentors who have been in STUDIO for more than one year are in the learning process. In developing a curriculum to teach the youth about healthcare and medicine, Stacy takes the perspective of the youth, by asking herself questions:

> While going through weeks and writing out the template, I constantly found myself thinking about what the youth would like and if they would find a certain activity interesting. Even if as a student/mentor I did not like a particular concept or activity, I had to think of the bigger picture and ask myself, "how and why would this activity be beneficial for the youth?", "Will this activity make the youth excited about…?" or "why wouldn't this activity work, what are other options for learning the same concept but in a different way?"

Stacy indicates the ability to take into account the youth's interests, culture, personalities, and passion when designing a curriculum. Drawing on her past experiences of being a student, she puts the youth at the center in the lesson plan. Instead of imposing what she enjoys and does not enjoy about healthcare topics, she takes the perspective of the youth by thinking through the

benefits and ways of learning healthcare issues. As much as Stacy ensures that the youth will learn from curricula, she also holds herself accountable to making the curriculum engaging and exciting for youth.

Another mentor, Chris also demonstrates the importance of social awareness in developing an effective curriculum. He grew up in an financially secure family and identifies himself as an Christian American male with a English and Swedish ethnicity. Working on a curriculum to teach about various molecules and the biology behind cooking, Chris describes how the process made him "more culturally aware and appreciative." He reflects on how his cultural awareness and knowledge of science were reflected in the curriculum by introducing an important Black botanist and inventor:

George Washington Carver was such an important topic for me because of his never-ending resilience in striving for education. When I began designing this curriculum, I wanted to have a week where we focused on one individual who had made some impact in terms of nutrition, but more importantly could be a good role model for the youth. Since the majority of STUDIO's mission statement is to promote STEM thinking and seeking higher education, I felt GWC embodied that. I was hoping the biggest take away from that day for the youth was that adversity will find most [people] in their lifetime, some much more than others, but anyone with enough resilience and determination in pursuing education can overcome hurdles that seem near impossible.

Most youth that the mentors interact with come from African American or East African and Southeast Asian refugee and immigrant communities. Although youth backgrounds and mentor backgrounds do not always intersect, appreciating the youth's backgrounds and culture supported Chris to intentionally incorporate George Washington Carver as both a botanist and inventor who contributed to nutrition and as a "role model" for youth into his curriculum. In this way, mentors' awareness and appreciation of the youth's racial and cultural backgrounds not only impact how they relate to the youth, but also how they create learning activities and environments that reflect the youth's culture and communities.

Social awareness such as empathy, respect and appreciation for diversity brings the mentors and youth closer through mentoring. By practicing empathy, mentors discover the youth's growth and learning trajectory in STEM subjects. In addition, perspective taking permits mentors to position youth interests, culture, and community at the center of STEM curriculum. The ability to think in the youth's shoes and respecting their culture is imperative in establishing safe and engaging learning spaces that integrate the youth's strengths and interests.

Relationship skills. Another important feature, and perhaps the most familiar, is to build relationships, communicate, and cooperate with those from different backgrounds. Other skills include being able to resist inappropriate social pressure and to constructively negotiate and resolve conflicts, and to seek or offer help when needed (Collaborative for Academic, Social, and Emotional Learning (CASEL), 2013, p. 9). STUDIO not only brings STEM expertise to the program, but also nurtures relationships between mentors and the youth. Mentors put this into practice and consider STUDIO as an avenue in which they support and inspire youth into pursuing STEM fields and careers.

When asked to describe an important interaction with the mentee, Sebastian explained how he supported youth to nurture college aspirations during a campus tour:

> One area where I think I helped youth develop college aspirations was being available as a non-biased imparter of knowledge. I told the youth what was enjoyable about college but did not hesitate to mention areas were college wasn't enjoyable. I think this helped the youth develop a more nuanced idea of college than what is typically shown and thus, made them more willing to explore other options and realize how they can take steps in high-school to have the best college experience.

STUDIO mentors are important supporters who assist the youth in pursuing STEM education and careers. Not only do they help youth learn STEM content knowledge through projects, but also support the youth to prepare for college to advance their STEM knowledge. Sebastian offered ample examples of his school life so that the youth can learn about what to expect in college. Like Sebastian, mentors actively engage in prosocial behavior in hopes to support the youth in achieving their personal and academic goals or completing their tasks in curriculum projects. They often share their personal stories about both the struggles and fun experiences during college in hopes to have the youth obtain the necessary information to explore various options to pursue STEM subjects at colleges. These honest conversations are what make up the healthy mentor-mentee relationships in which the mentors and the youth build trust in each other at STUDIO.

Some mentors build rewarding relationships with the youth by communicating personal stories and actively listening to youth. For example, Sipara shares her story about an activity in which she and the youth were learning about each other:

> The activity was learning about each other by asking personal questions among mentors and youths. I had the chance to learn a lot about her through the questions I was asking and she learned a lot about me through the questions she asked me. I thought my conversation with her was interesting. We talked about common traditional food Ethiopians and Somalis have like injera. She told me how passionate she was about her education and getting 4.0-grade point average so far. When I hear success stories in education I encourage them right away and also share a personal experience of mine.

In this session, Sipara and the youth were able to learn more about each other as people as well as within STEM. Sipara self-identifies as a Black Gurage female immigrant with Ethiopian Orthodox views from a low-income family. She was able to learn about the youth's passion and similarities between them through active listening and personal questions. As someone who upholds her culture and traditions very highly, Sipara enjoys building this relationship with a youth who is also raised in African diaspora community. While STEM youth mentoring programs often use subject matter to instill passion for STEM fields among youth, Sipara's story exemplifies how STUDIO cares deeply about creating an environment in which mentor-mentee relationships are at the center of the work.

In another self-reflection, Jerry's story highlights how building a relationship could facilitate youth interests and motivation in STEM fields while overriding the differences between mentors and mentees:

> Another encouraging moment that occurred regarding facilitation of interest happened when having the youth work on their vision boards. At first, both H and A were pretty disinterested in the task and were putting forth minimal effort. In an attempt to get them more interested Stacy and I began to ask them questions regarding their future, such as job profession, where they wanted to live, what kind of life they would want to be living. Both said that they wanted to be NBA players like Steph Curry. When they said this I saw an opportunity to morph the conversation towards STEM and academics, so I began to explain to them that it was pretty uncommon that for people to go straight to the NBA and that they would have to play college basketball before getting drafted into the NBA. They acknowledged this and decided that they would then want to play basketball at the University of Washington before going to the NBA. This allowed me to interject to them that even if they were playing college basketball they would still have to pursue a degree of some sort, which allowed me to ask them both what they would want to study while they played college basketball. They both replied that they didn't have any idea what they wanted to study, which is completely reasonable at their age. However, I found this to be a really encouraging interaction because it displayed to me that facilitating interest and motivation in projects with youth at STUDIO can be done by finding a middle ground of common interest.

As a non-religious white American male who was brought up by a financially secure family, Jerry's demographics do not overlap with those of the youths. However, Jerry was able to develop a better understanding of youth's interests by asking specific questions about their college aspirations and future. Even when the youth did not seem interested in learning the subject at first, Jerry took this opportunity to connect their interests to pursuing STEM subjects in college. This interaction illuminates how mentors generate youth interest by communicating with them and encouraging both their interests and their consideration of STEM projects. In other words, Jerry's experience with these two youths represents how mentor-mentee relationship building lays the foundation for youth STEM learning.

Another mentor who self-identifies as a Japanese American male who grew up in a financially secure family with Buddhist views expressed the bidirectional characteristic of the mentor-mentee relationship at STUDIO. During a photography curriculum, Jathan and two youth were experimenting with a DSLR camera:

> It seemed to me that they were having a little hard time understanding how to work our camera properly. When they would take a picture, nothing would display because the ISO, shutter, and aperture were not in balance. I couldn't blame them because I too was still a little confused on how each thing worked. When they asked me what to do, I had to admit I did not know what to do and work with them to try figure out how to get our picture to display properly on the camera.

Jathan was honest with the youth about his knowledge regarding using the camera, which transforms the youth's role in the activity. This valuable interaction negates the typical mentoring one-sided relationship and displays that mentors can learn with and from the youth. This type of mentoring relationship is in stark contrast with traditional youth mentoring models in which mentors are positioned as the more knowledgeable other. STUDIO runs on a learner-centered structure in which not only mentors, but also educators, staff, and graduate students are all intentionally building knowledge together to address critical issues in the program. Mentors will sometimes be working within curricular areas where they are beginners too. Within this community of learner model, mentors constantly negotiate their roles and understandings of the activities while they mentor the youth (Rogoff, 2009). As such, Jathan's self-reflection offers insights not only about how mentors display relationship skills, but also about what type of relationship they construct with the youth.

Since relationships are at the heart of STUDIO, mentors carry out relationships skills to help youth achieve their goals, communicate their personal stories, actively listen to youth, and to build rewarding and healthy mentoring relationships. In order to retain youth autonomy, mentors select appropriate ways to help youth complete their curriculum projects. They also become active listeners to build common ground with youth and to connect youth interests to STEM subjects and college planning. As mentors engage in relationship skills, they go through the process of changing mentoring practices and roles, which counteracts hierarchical dynamics in typical mentor-youth relationships.

Discussion

This paper was organized into three major sections: the description of the STUDIO mentor handbook and its creation process, a literature review on STEM youth mentoring programs, and an analysis on STUDIO mentors SEL. The first section examines how STUDIO can best support the new mentors to respond to various scenarios with youth and to generate SEL skills needed in the program. As a result, a mentor handbook was created to onboard the new mentors and help them understand the various responsibilities and expectations. The second part is a synthetic review of literature on existing STEM youth mentoring programs, intended to understand STUDIO's position among other similar programs. This review identified the research gap in evaluating program impact on participating mentors and argues that STUDIO is unique in its focus on relationship building between the mentors and mentees, which requires SEL skills on the part of the mentors. The third section contributes to how STUDIO mentors engage in SEL while interacting with their mentees through an analysis of mentors' self-reflections on their experiences.

In response to creating a better mentor onboarding process and to foster SEL skills, "STUDIO mentor handbook 2017" was created in collaboration with a undergraduate volunteer who had user design experiences and knowledge. As a consultation tool for new mentors, the handbook included various information such as STUDIO principles and values, mentor responsibilities, leadership opportunities, and mentors' stories. Information was organized in a way to touch on the new mentors' interest in and passion for giving back to the community by sharing their STEM expertise through youth mentoring. Over the course of eight months, we went through an agile cycle of feedback and revision based on insights from the research and

planning team meetings, mentor orientation, and mentor interview results. While creating the handbook, we discovered that it could also be used for designing the mentor orientation content and recruiting mentors.

The synthetic review of literature was conducted to consider how available STEM youth mentoring literature identify features of effective mentoring relationships and relationship-building processes in which mentors manifest SEL skills. Previous literature addressed how mentors' multiple roles as a learner and a role model contribute to effective mentor-youth relationships. Furthermore, they state that mentoring experiences help mentor gain career-related skills such as project management, communication, and collaboration skills. Lastly, mentors obtain engagement skills to help youth become interested in the STEM activities by understanding youths' prior knowledge, learning styles, and background. However, the review shows that there is a lack of research on STEM youth mentoring programs in general and on the process in which mentors enact SEL, thus calling for a study to evaluate mentors' narratives on their mentoring experiences at STUDIO.

Research findings from the deep analysis of mentors' self-reflections reveal the process in which STUDIO undergraduate students engage in SEL while mentoring the youth. Through self-reflections, mentors are undertaking self-awareness of their own emotions, thoughts and behaviors. This reflective practice also helps mentors to learn about themselves including mentoring values and goals. Mentoring is an evolving and challenge practices, which pushes mentors to exercise self-management. Especially, mentors who are developing curriculums are required to adapt their behaviors and activities depending on youth needs and responses. In addition, they organically carry out social awareness in understanding youth who come from

various backgrounds and culture. Mentor narratives illustrate that taking the perspective of and respecting the youth are imperative to creating a safe and learning environment for the youth who are seen as learners, replacing the dominant deficit views. Lastly, mentors take on relationship skills through communicating with, working with, listening to, and helping youth. Consequently, mentor-mentee relationships at STUDIO become rewarding and bidirectional, in which not only mentees learn but also mentors learn.

Limitations exist in all research. The prompts for self-reflections ask mentors to speak about their interactions with the youth only from one side. Their response will change depending on the nature of the prompt. In addition, in order to collect in-depth stories, interviews would have been useful tools, allowing mentors to freely discuss any ideas they have in response to the questions. From a sociocultural standpoint, mentors learn SEL skills by creating, using, and sharing cultural tools, artifacts, and knowledge within social and cultural contexts (Vygotsky, 1987). Therefore, collecting more information on the mentor's history including past mentoring experiences, exposure to ideas around mentoring, and current and future views of mentoring would be beneficial to this study.

However, this research has the potential to contribute to a better understanding how mentors are impacted by participating in STEM youth mentoring programs. This study will add to the research literature on the relationship building processes underlying the success and effectiveness in STEM youth mentoring programs. Specifically, this study is helpful in understanding how mentors learn to be self-aware, self-manage, socially aware, and to build relationship skills while supporting their mentees' learning and building mentor-mentee relationships. It also demonstrates that these SEL skills are equally important to the STEM

knowledge that the mentors are bringing to their work. Furthermore, the knowledge embedded in this paper will be beneficial to practitioners, researchers, and educators working in STEM youth mentoring programs. Learning from STUDIO's unique youth mentoring model can help us understand how such programs require mentors to be equipped with SEL skills and their impact on mentor-mentee relationships.

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Appendix A

Interview Protocol for Returning Mentors

- Begin by welcoming, introductions, and stating that the purpose of interview is to test the handbook, not the mentor
    - Make them comfortable, and help them to realize that they are there to help us objectively improve the product, and not being evaluated on how well they like the handbook or us.
- "What was your experience settling into your mentorship when you started with STUDIO?"
    - Get an unfiltered response, and initial reactions for their beginning with STUDIO. It is important to get responses like this, before we have asked any questions, in order to keep bias out as much as possible.
- "What were some of the major lessons that you have learned about how to be a successful mentor in STUDIO?"
    - We can see what mentors think are important skills and things to know for mentorship- these are things that probably should be in the handbook
- "Where did you find these lessons?"
    - If we find a common resource, we could potentially look into it to dig for more insight.
- "What were some major pain points you encountered as a new mentor?"
    - A goal of the handbook should be to equip new mentors to avoid these pain points.
- [Have them review the handbook]
- Do you see the things that you brought up addressed here?
    - Looking not only for factual knowledge (is information present, we could look for that). Looking for approach knowledge- did we address the information in a way that would have made sense for the mentor and helped them?
- "What is at least one thing missing from the handbook?"
- "What is at least one thing that could be improved in the handbook?"
- Thank them for their time!

Appendix B

Interview Protocol for New Mentors

- Begin by welcoming, introductions, and stating that the purpose of interview is to test the handbook, not the mentor
    - Make them comfortable, and help them to realize that they are there to help us objectively improve the product, and not being evaluated on how well they like the handbook or us.
- "What information did you have about STUDIO before the quarter began?"
    - This should act as a sort of control to help us understand the impact of the handbook
- Allow 5 or so minutes for the mentor to refresh themselves on the handbook
    - So that they can remember all of their initial impressions, or find new insights
- "What are your thoughts after going through the handbook? How do you feel approaching your mentorship this quarter?
    - It is important to get unfiltered initial reactions, because this helps us to realize the tone of our product
- "How often have you referenced this? How often do you think that you will reference it in the future?"
    - Helps us to gauge lasting impact of the handbook, or if the handbook even needs to be something that is returned to
- "Could you describe what STUDIO: Build Our World is?"
- "Could you describe what the purpose of a mentor is?"
    - These questions help us check the comprehension the mentors received after reading the handbook
- "What is at least one thing that is missing from the handbook?"
- "What is at least one thing that could be improved?"
    - Trying to not lead interviewee while still asking for feedback in a direct way
- "What other resources would you want to help you feel supported as a new mentor?"
    - Optional: might be worth getting ideas for other possible resources that would be helpful to be developed for new mentors.
- Thank them for their time!