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An Interdisciplinary Learning Community of Education and Psychology Majors

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Abstract: The researchers conducted a qualitative case study to describe the experiences (over the course of a semester) of an interdisciplinary team of three special education and three psychology undergraduates who participated in a relational learning community and a graduate student who designed and facilitated this learning community. An Associate Professor and special education researcher oversaw and co-facilitated the project. The design of the learning community promoted the building of rapport and trust among the group members and the progress of the group toward a common goal of incorporating principles from psychology to develop teaching strategies for students who are struggling in math and experiencing severe math anxiety. Gathering more frequent and individualized feedback would have helped the learning community facilitator make some key adjustments earlier in the project, but the incorporation of rapport building activities that supported trust and collaboration among the group was supportive of group progress toward a common goal. We learned key lessons about how to design and implement a learning community that can be applied to the field of education, interdisciplinary collaboration, and other contexts.

Keywords: relational learning communities; mathematics learning; math anxiety

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1. An Interdisciplinary Learning Community of Education and Psychology Majors

Teaching children math can involve much more than knowing academic content and teaching strategies; often, psychological factors play a major role in what teachers need to consider while making decisions [1,2]. Thinking about many pieces of information all at once—especially when experiencing extreme anxiety and/or *not* being good at an academic concept or skill yet—can create problems for students beyond the typical challenges we all face when learning something new and complex [3–5]. Struggling students can experience considerable, and sometimes rapid, success when teachers effectively apply certain principles from psychology; for example, strategically organizing information on paper, gesturing while speaking, and connecting new information to what students already know can dramatically impact students' learning at times when they are overloaded mentally, and especially so when they are experiencing a lot of anxiety and are having trouble thinking clearly [6–8]. It can be useful for teachers to learn about how some key concepts from psychology can be applied to their own teaching repertoires [9,10].

To provide access to more psychology content beyond the required courses in psychology (and integrating some psychology topics into teacher preparation courses), teacher educators could consider providing opportunities for education majors to collaborate with psychology majors on projects where they can combine information from both fields toward a common goal (e.g., improving math instruction for students with learning disabilities and/or severe math anxiety). Ideally, this collaboration could also be beneficial for psychology majors regarding their learning about the field of education and how psychology can be applied to real-world settings. This work could help prepare them for later roles as clinicians, therapists, researchers, etc. in the field of psychology. To provide the right

combination of comfort and focus that these college students might need to work together (e.g., to trust each other and remain focused on a common goal), a learning community format is a potential option [11,12]. This format has been useful in fostering interdisciplinary collaboration with undergraduates from a variety of majors (such as psychology) as well as professional development for teachers [13–17]. In this study, the authors focused on how to design and implement a learning community to promote the learning of all RLC members with the end goal of designing math instruction for struggling learners (e.g., combining principles from psychology about anxiety with math instruction principles from education) and searching for information about how an RLC can be applied to other situations in our fields as well as others.

1.1. Learning Communities

Lenning and colleagues [12] defined a "learning community" as "an intentionally developed community that exists to promote and maximize the individual and shared learning of its members. There is ongoing interaction, interplay, and collaboration among the community's members as they strive for specified common learning goals" (p. 7). Learning communities were created on the tenets of active learning, discussion, and collaboration, with an ultimate goal of helping the members develop problem-solving skills [18]. Relational learning communities differ from general learning communities as they focus specifically on "the creation of, maintenance of, and reflection on the functioning of relationships, [and the] understanding that the quality of learning is only as strong as the relationships in which the learning is constructed" [16] p. 2.

Hill [19] suggested that if you allow people with related interests, especially those teaching and attending higher education, to come together and give them time and space to collaborate, then "a gush of creativity comes forth and people start to learn again, [and] feel excited about their work" (p. 5). Raider-Roth [16] posited that "lasting and transformative teacher learning can occur in the context of relational learning communities . . . [where] explicit attention is paid to the construction and nurturing of relationships between and among the participants, facilitators, texts/content" (p. 2). In addition to setting and maintaining grounds rules/shared norms, relational learning community (RLC) leaders can integrate rapport and trust-building exercises into their meetings (e.g., setting ground rules/establishing shared norms, shared meals, check-ins and check-outs, ice breakers, etc.). RLC leaders can use these activities for gathering key information about the group members (e.g., their home lives, talents, and worries) which can be useful to RLC leaders when strategizing about how to get RLC members to work together well [16,20,21].

Although there are many advantages to establishing relational learning communities, there are inherent challenges as well. Ensuring group members are valued and given credit for their work and maintaining an atmosphere that promotes collaboration and productivity are two such challenges [13]. RLCs face challenges relating to intellectual property rights, especially when working with undergraduate students and other researchers. Fleck [13] explained that "where student input is formally harnessed, performing rights have to be addressed" (p. 408).

Additionally, establishing and maintaining relational awareness can be challenging; being able to recognize when disconnection happens within the group and being able to repair the disconnection is critical. Disconnection is natural within a learning environment, especially when discussing topics where opinions and ideas can differ. Raider-Roth [16] illustrated that disconnection can be experienced by facilitators or group members as a "decrease in energy, sense of being stuck or unable to act, confusion or cloudy thinking, a reduced sense of self-worth, and waning desire to remain in relationships" (p. 28). When disconnection occurs, it is imperative that repair follows, allowing for facilitators and group members to continue building knowledge. Raider-Roth [16] described several strategies to repair disconnections as they occur with learning partners and facilitators, such as privately responding to members' concerns and having an open discussion about disconnections that occurred throughout the sessions.

1.2. Purpose of Study and Research Questions

Past research on learning communities has conveyed the importance of bringing people—with different backgrounds and skill sets and a shared goal—together to generate ideas and solve problems [13,16]. However, more research is needed on conducting relational learning communities at the undergraduate level and how students with different kinds of educational training and field experience can be combined in strategic ways to prepare future practitioners and researchers to address real-world problems in the community. The purpose of this study was to analyze how a learning community format can be used to promote the learning of education majors and students majoring in psychology as potential future researchers and/or practitioners in fields such as education, clinical psychology, experimental psychology, etc. The research questions of this study were: (1) What are the experiences (e.g., perceptions of collaboration as well as development and application of knowledge) of education and psychology majors in a learning community focused on the math teaching of struggling learners? (2) What are the experiences (e.g., the development of knowledge regarding the design and application of a learning community) of the facilitator (i.e., the graduate student) of this learning community?

2. Methods

The researchers used a qualitative case study design to describe the experiences of the undergraduates/RCL members and a graduate student/RLC facilitator who is the first author of this study [22]. The second author, and co-facilitator of the learning community, was the principal investigator of a larger research project focused on training education majors to teach mathematics to students with learning disabilities through the use of a tutoring program. The goal of the study was to take the tenants of an RLC as presented by Raider-Roth [16] and create an interdisciplinary undergraduate learning community with psychology and special education undergraduate students. The authors set the goal to create (and analyze) an open, collaborative relational learning community to support everyone's learning, allowing one another to be able to learn and grow in productive ways. In addition to analyzing the mechanics of an RLC, the researchers set goals for the RLC including putting their heads together, coming up with solutions, and implementing the solutions in practice for teaching mathematics to struggling learners; math-teaching-oriented aspects of this larger project will be reported in forthcoming research papers.

2.1. Procedures and Setting

During a research meeting between the authors about how to utilize the work of some undergraduates (a combination of education majors and psychology majors) who had been hired as tutors and/or research assistants, the second author stated that he believed that we would need a certain level of comfort and camaraderie among the research team/group members for situations where members needed to take risks and possibly appear vulnerable, such as in the following:

- Asking someone from a different field to explain (and sometimes re-explain) something that may be basic and/or obvious to members of that field;
- Presenting situations where they had struggled in their studies or field work to members of related fields who may not have experienced—and may not understand—the struggles inherent to that particular field.

In response to these concerns, the first author proposed a learning community structure. The sessions were co-led by the first and second authors in this study. The second author guided the discussion regarding the goal of combining what the undergraduates added to the RLC regarding developing better math instruction for the high school students with learning disabilities that the education majors were tutoring at the time. The first author planned and guided the rest of the RLC regarding the overall structure of the meetings, rapport building, pacing, taking breaks, etc., and those aspects of the work are the focuses of this paper; findings regarding math instruction will be reported in other papers.

In order to achieve our goal of creating an open, collaborative relational learning community to support the undergraduate students' learning, we utilized Raider-Roth's [16] suggestions about how to construct an RLC, such as the following:

1. Thinking carefully about the arrangement of physical space;
2. Providing confidence-building experiences;
3. Sharing meals;
4. Establishing shared norms for learning;
5. Asking group members to share their thoughts each week about the RLC.

We focused on nuances of the work setting and environment to deal with the challenge of establishing the right balance between (or even some synergy with) comfort and focus on goals. The goal was not only to stay motivated and put forth a strong effort, but also to build enough rapport with one another to be able to take risks and support each other in the right ways to support our success.

To coincide with and support an existing tutoring program that was taking place during the spring semester, the RLC met each Friday during a 15-week semester for an hour and a half in a classroom at the affiliated university. We met once a week to build on weekly tutoring sessions at a local high school. One of the RLC sessions was held at an off-campus site. Regarding the physical structure of our meetings, we set up the room so that RLC members could sit in a circle, be able to move chairs around, and have a whiteboard and/or SmartBoard for note taking or illustrating ideas.

During the first RLC, the first author explained our ground rules/shared norms, created an agenda, and explained to the undergraduates that we would begin each learning community session with a "check-in". We built-in confidence-building experiences and other exercises to create openness. For example, we put ice-breaker/check-in exercises into our RLC at the beginning of our work to build relationships among the group members. During the first two RLC sessions, the first author modeled the check-ins by asking the questions and providing her own responses. The check-in questions were designed to get to know one another, starting with simple introductory questions and leading to more personal questions as the semester progressed and the undergraduates, facilitator, and co-facilitator got comfortable with one another. Examples of the check-in questions included:

- What is your name, major/area of concentration, and a professional goal for when you graduate?
- What is one thing that would help you feel comfortable or successful within the learning community?
- What gives you life or energy? What drains your energy?
- What type of situations make you feel anxious? What helps you when you are feeling anxious?
- What is something that has brought you joy recently?
- Describe a time when you could have communicated better.

Shared meals were implemented as another aspect of community building. The goal of our shared meals was to create an informal environment to encourage conversation and relationship-building between the group members, the facilitator, and co-facilitator. For the first couple of sessions of the RLC, we provided snacks for the education and psychology undergraduates. Within the first couple of sessions, we also sent out a Google Form asking the group members what food they would like to have throughout the semester and whether there were any dietary restrictions. Once the first author had compiled a list, she sent out a SignUp Genius to allow group members, the facilitator, and the co-facilitator to sign up to bring food each week. The group members were assured that signing up was voluntary and that during any weeks that were not accounted for, we would provide the food.

At the end of each meeting, we would answer one to two "check out" questions verbally, with the whole group, to give each group member a chance to provide input with the goal of them feeling that their voice was being heard and to help us further

build relationships with one another [16]. After the RLC members left for the day, the authors would have meetings to discuss how the meeting had gone that day and to plan how to support the learning and participation of each undergraduate student in upcoming meetings.

2.2. Participants

At the time of the study, the facilitator was a master's student in an Educational Studies program with a focus on research methods. She had six years of experience as a special education teacher and as a behavioral coach for other teachers. She graduated from her program at the end of the semester when the RLCs were conducted. She was in her late twenties at the time of the study. She had taken a course the previous semester that was heavily focused on the structure of learning communities and had participated in some learning communities as an undergraduate between 2011 and 2015. While she had not worked with undergraduates before this study, she had worked with professionals from a variety of fields in her role as a special education teacher (e.g., occupational therapists, speech pathologists, mental health therapists, school psychologists, etc.).

The co-facilitator was an Associate Professor of Special Education with ten years of experience at his current position. He had taught in K-12 settings for six years and worked in the mental health field for three years. His research was focused on interventions for students who were struggling with math, tutoring programs, and teacher preparation.

The undergraduates were hired by the second author for working in the RLC; they were purposefully sampled based on availability regarding their schedules, prior success, and qualifications [23]. The psychology majors were hired from a pool of applicants after they were interviewed and had demonstrated some success in research meetings on other projects; all three psychology students had worked for the co-facilitator on research projects the previous semester. The education majors were hired after demonstrating success in the second author's college courses and tutoring programs; they were students of and had worked for the co-facilitator for approximately one semester prior to the learning community was initiated. The RLC consisted of three special education (SPED) undergraduates and three psychology undergraduates. Each special education undergraduate came to the RLC with their own background and goals for the population of students they wanted to work with. Alex was interested in working with students with mild to moderate disabilities. Sam and Julie were interested in working with students with moderate to intense disabilities and had previous experience working with individuals with autism spectrum disorder. The psychology undergraduates had their own unique concentrations and academic backgrounds. Andrea was an experimental psychology major and Lily and Emily were clinical psychology majors. Andrea and Lily were also majoring in neuroscience. All learning community members were juniors in college except for Emily, who was a sophomore, and Andrea, who was a senior at the time of the study. All of the members had some experience with learning community formats in the courses and during orientation activities as freshmen. Pseudonyms are used for all members of the RLC. Both the psychology and SPED undergraduate students were paid for their time in the learning community and tutoring sessions using funds from a larger project, mostly in the form of hourly pay and sometimes as part of a scholarship for undergraduate research. All of the undergraduates attended every meeting other than one participant who was out of town one week.

2.3. Data Collection and Analysis

The first author focused on establishing the learning community structure and making adjustments as needed. Her data collection procedures included taking field notes/memos throughout each session [23], including some direct quotes from the group members, facilitator, and co-facilitator regarding different aspects of the RLC along with their responses to the "check in" and "check out" questions. Near the end of the semester during which the learning communities took place, we asked the members of the RLC to complete a Google

Form survey regarding their experiences and feedback on the learning community to guide future research and practice. The first author designed the survey questions to gather some specific information but also be open-ended enough to allow participants to expand on their feedback. The survey included the following questions:

- Give your overall impression of the learning community.
- How did the learning community support your learning?
- If you were to participate in another learning community, what could be improved or done differently?
- Our learning community focused on bringing together SPED and Psych undergraduates to discuss and collaborate on various cognitive theories and how they relate to helping high school students with LD pass Algebra. If you were to participate in another LC, what topics would you like to see covered/who would the participants of the LC be?
- Describe your overall relationships with the other members and facilitators of the learning community (i.e., how did your relationships change throughout the semester).

The first author conducted open coding to organize and categorize the data. She identified key instances from RLC meetings (using field notes and memos) and the survey, and she grouped them into categories and looked for themes that emerged [24,25]. Then, during a research meeting, the first author consulted with the second author about her interpretation of the findings. The second author also read through the first author's findings and searched them for themes regarding success and potential areas for future growth for both authors in the context of designing and implementing RLCs.

To monitor the accuracy of our data collection and analysis, we asked two RLC members (education majors who were still in frequent contact with the second author) to do "member checks" to make sure we had accurately represented their work during and after the RLCs [22]. We consulted with an external auditor, a school psychologist with many years of experience in the field conducting meetings (with parents of students with disabilities) involving practitioners from a variety of fields (e.g., teachers, social workers, administrators, speech pathologists, occupational therapists, school counselors, etc.) who are working toward the common goal of planning the education of students with disabilities. We asked RLC members and the school psychologist to carefully analyze the interpretive validity of our work and provide suggestions regarding future RLCs and other interdisciplinary collaborations [26]. The special education majors and the school psychologist approved of the conclusions we made about our data.

3. Results

Results are reported from the perspective of the first author who took the lead on the logistics of the room and the structure of our meetings, community building among group members, and data collection. She dealt with challenges such as a cumbersome physical space and building confidence among some RLC members, as well as providing the food, activities, and meeting structures to foster camaraderie and productivity among the group. She also had to contend with the tendencies of the second author, which, for *better or worse* and *from self-report* (as stated by the co-facilitator to the facilitator during research meetings), could be a little authoritative and hyper-focused on rapid progress toward goals (at times more so than toward the group members' comfort) for the spirit of an RLC (e.g., not realizing when the group needed a break, directing the conversation away from what some RLC members wanted to talk about when it did not fit his perception of group goals, not focusing as much on socialization as might be needed at times, etc.) The first authors' responses to these challenges and other positive outcomes from the project are reported from her perspective in this section using a narrative format. We also report findings regarding RLC members' perceptions of the project.

3.1. Physical Space

Upon entering the room on week one, the tables and chairs were scattered and disorganized and I noted that there were no windows in the room. Due to COVID-19 restrictions, the university was on a hybrid schedule for week one with the learning community. Therefore, we provided the option to the undergraduates to participate via Zoom, utilizing the OWL device (with video conferencing software) from the library. The three SPED undergraduates decided to participate in the RLC via Zoom during week one while the three psychology undergraduates joined in person. The members attending in person sat around two of the round tables and faced the laptop and OWL device. Unfortunately, the OWL voice recognition software was not working properly, and so, the OWL device did not move and display who was speaking. I noted that the psychology undergraduates spoke more and the SPED undergraduates kept their microphones muted for most of the session.

During week two with the RLC, Alex commented, "this space is so depressing and dark" upon entering the room as half of the lights would not turn on. After this comment, and upon learning that Andrea worked at a local outdoor restaurant, I noted that having "off-campus" meetings or meetings outside would help to create an open environment for all. Additionally, after the university lifted its remote/hybrid policy, members of the RLC attended in person each week unless they were absent due to personal or professional obligations.

To combat the disorganization of the tables and to create a more inclusive setup, I decided to set up four half-moon tables into a "U" shape during week three with the learning community. This allowed for the members of the RLC, the facilitator, and the co-facilitator to feel as if they were all sitting together, rather than at different tables. It also allowed me to place the OWL device in the middle of the setup so that it could pick up the entire conversation throughout the session. Approximately three members commented that they liked the new setup; therefore, I continued to set up the room in the same manner throughout the remainder of the semester.

After meeting on campus for the first six weeks, we met off-campus for our seventh meeting. We met at a local coffee shop that I recommended. I was able to reserve their private conference room, which included a long antique table with matching chairs. The room was decorated with antique pictures, plants, and a rug that covered the original hardwood floors. Multiple members of the RLC commented on how "cute" and "cool" the coffee shop was and mentioned that they would like to come back to that location to work as a group.

The physical arrangement required some thought, and the group members' reactions to this were informative for me. During week nine with the learning community, Alex, Sam, and Julie arrived at the room first and set up the tables and chairs, showing a level of comfortability and familiarity with how we all preferred the physical space. As we started to brainstorm about a collaborative paper regarding our work, I brought over the whiteboard that was on wheels to the "U"-shaped setup. The following week, we decided to start to collaborate on our paper, and so, I set up the tables and chairs around the SmartBoard, as we were going to hook one laptop to the SmartBoard to display the work. However, the room was not equipped with an HDMI cord, so we brainstormed as a group and decided to start a Google Document that we could all collaborate on. Throughout the ten weeks of sessions, the undergraduates, facilitator, and co-facilitator were able to adapt to the environment. The half-moon tables and chairs with wheels, at first scattered and disorganized, eventually allowed us to create multiple variations of setups for the different activities we were completing.

3.2. Confidence Building

Each week, we began our relational learning community meeting with one to two "check-in" questions. These questions were designed for us to get to know one another and to create an open environment [16]. During the first session, my goal was for the members

and facilitators of the RLC to learn a little about each other and voice what would help them to be comfortable and successful in the learning community. These first-week questions set the basis for our shared norms for learning. The questions included:

"Tell us your name, major/concentration, and a professional goal after graduation."

"What would help you feel comfortable and successful in the learning community?"

During week two with the learning community, I continued to have the members and facilitators open up to one another with light, but reflective, questions: "What gives you life or energy? What drains your energy?" To help make the undergraduates feel more comfortable and to give them examples of responses, I answered the questions first. The answers provided also set more shared norms for learning, as we were able to learn how to keep each other's energies high. For example, Emily replied "being in a space where I have to fight for a chance to speak drains my energy", which provided insight into how we could help this undergraduate be successful within our learning community. This check-in question also allowed us to make connections with one another. For example, both Julie and Emily mentioned that going to the gym and being in nature gave them energy. These responses started a one-to-two-minute conversation between all the members regarding how nice weather and nature were important to them.

The following week, I encouraged the undergraduates and facilitators to get to know each other on a deeper level with the question: "What is a movie/documentary/TV show that you connected with or means something to you?" This question gave us a glimpse into each other's personalities, interests, and what makes something meaningful to us. For example, Lily replied that *A Beautiful Mind* was a movie that got her interested in psychology and that she connected with it because she had a family member with Schizophrenia. This member trusted us with a deep, personal connection to the movie, and it seemed like this allowed us to be more open with one another.

During week three, the learning community decided that the next topic of discussion would be anxiety and how it affected the students that the SPED undergraduate tutors were working with. Week four with the learning community was canceled due to inclement weather; therefore, during week five, I decided to relate the check-in questions to the topic that we would be discussing: "What type of situations make you feel anxious? What helps you when you're feeling anxious?" Not only did these questions allow us to segue into our topic for the week, but we were able to learn more about one another. Interestingly, after each member shared their responses (e.g., challenges they had faced while teaching or being students, personal challenges with mental health, dealing with stressful family situations, etc.), other members would add anecdotes about how they related to that person's answer. The confidence-building exercise started to feel more like an open conversation rather than a turn-taking exercise. This openness continued throughout the semester.

During week eight, we skipped the check-in question due to the members and facilitators having shared conversations before we started the session until fifteen minutes after our original start time. We had a full agenda for that day; therefore, we decided to skip check-in and get started. However, rather than feeling that I had missed an opportunity to benefit the group with a confidence-building exercise, I felt that the comfortability displayed by the undergraduates with one another during the opening conversation exhibited their relational growth with each other. At this point, it seemed like we did not need confidence-building exercises to feel good about our work and be productive.

The check-in process throughout the semester was an integral part of creating an environment of openness and allowing everyone to feel comfortable sharing their ideas. One member responded to the survey by saying, "I really enjoyed having the check-ins each session, I thought they allowed us to connect on a more personal level. And by allowing us to be more comfortable, it increased the value of our conversations each session".

3.3. Shared Meals

During week one with the RLC, I brought individual bags of flavored popcorn for the members and facilitators to choose from. While discussing the structure of the learning community, I asked the undergraduates for ideas on what kinds of food they would like each week. Most members did not respond or replied with "anything is fine with me". We all agreed that we wanted to take turns bringing the shared meals. During week two with the RLC, I created a SignUp Genius to allow each member and facilitator to choose a week in which to bring their shared meal. They also noted what they would be bringing so that we could have a variety of food items from one week to the next.

During the first couple of sessions, the members of the RLC seemed hesitant to grab a snack; therefore, when I brought doughnuts during week three, I encouraged everyone to take a doughnut when they came in to get settled. For the remainder of the RLC sessions, the timing of when members grabbed snacks varied, ranging from right away to 45 min after the session had started. Examples of meals that were brought each week included doughnuts, bagels and cream cheese, muffins, BBQ pulled pork sandwiches and chips, candy, fritters, and various pastries.

During week seven, when the RLC met at a local coffee shop, each member bought their own coffee and food before the session started. However, many of the members stopped eating when the discussion started. Forty-five minutes into the RLC, I suggested that we take a break for everyone to be able to get refills and continue eating their food. I was happy with the productivity of the group, but I suggested the break to devote some time to comfort and rapport building.

Each shared meal provided the members and facilitators with a chance to talk in a more informal setting while everyone was eating. Many times, the shared meals allowed us to move from heavy, academic talk to light-hearted conversations about ourselves. The presence of the snacks also allowed me a structured opportunity to offer a break when the discussion was becoming stagnant. Reflections about the learning community yielded positive thoughts about the shared meals including "The collaborative nature of the learning community was great and I loved getting to know everyone better through the check ins/outs and the shared meals" and "...the snacks and check in questions created a level of comfort that produced insightful discussions".

3.4. Shared Norms for Learning

During the first session, I used the check-in question to allow the undergraduate students to express what would make them feel comfortable and successful in the learning community. Several members, including Sam, Andrea, and Lily, responded that members keeping an open-mind and being open to learning from one another would help them feel comfortable. A common theme among both the SPED and psychology undergraduates was getting to learn more about the other discipline and being open to learning new things.

As we progressed through the first six or seven sessions, I was able to more easily determine when the undergraduates needed a break from the discussion. I observed that the conversation would sometimes become idle or that one discipline would dominate the conversation with the other undergraduates remaining quiet. I considered these occurrences as disconnections with learning partners and texts or content [16]. Once I had decided there was not enough collaboration, I would have the RLC take a break so that we could regroup. I used the break as a form of repair. For example, during the discussion at the local coffee shop, the discussion was based around neural-networks, with Andrea and Lily (who were double majoring in both psychology and neuroscience) having most of the knowledge base on the conversation and being encouraged by the second author to share their knowledge on this topic extensively. After about 35 min, I had the group take a break. During the break, the conversation was more personal, with the members and facilitators laughing and making connections based on personal stories.

Another topic that appeared later in the semester included the differences between the coursework for the SPED and psychology undergraduates. Andrea, Emily, and Lily (the

psychology undergraduates) explained to Alex, Sam, and Julie (the SPED undergraduates) that when they had to write papers, the APA format was very important. Alex, Sam, and Julie noted that for special education, their coursework was more project-based rather than being based on research papers. They also discussed how, with SPED research, it was hard to control for variables and confounding variables, which would be anxiety-provoking for psychology researchers. This led to a discussion on how the disciplines needed one another for the fields to progress in some key ways.

These discussions on the differences in learning illustrated the importance of the interdisciplinary facet of the relational learning community. One undergraduate reflected, "The learning community supported my learning by exposing me to new thoughts and perspectives from others. I particularly enjoyed the interdisciplinary aspect as others were able to share knowledge that I would not have otherwise been exposed to".

3.5. Weekly Reflections with the Group

Each week, we would conclude our sessions with one or two check-out questions to reflect on our learning processes or to set personal/professional goals for the upcoming week. These questions were often paired with a light-hearted question such as "What is one thing you will do to relax this weekend?" During the first week, I asked members what had helped or hindered their learning during the first session. Each undergraduate commented that hearing from the other discipline had helped their learning. For example, Emily commented that she had "never talked with a special education major before" the learning community and, although both authors though he was quite effective in the RLC, Alex expressed that being nervous had hindered his learning in some way.

During week two, every member and facilitator reflected that everyone being in-person, rather than having some members be on Zoom, helped their learning and explained that the conversation flowed better. Throughout the rest of the RLC sessions, sample check-out questions included:

1. "What is one topic you would like to discuss during the learning community that we have not covered?"
2. "What helped or hindered your learning today?"
3. "What is one goal you have for yourself over the weekend?" (academic, personal, professional, etc.)"

Our daily reflections were limited to group reflections. However, upon reviewing the survey feedback, we know it would have been helpful if we had utilized individual reflections where members could keep track of their own questions, ideas, and discomforts for the group. These individual reflections would have allowed us to better address concerns that were not voiced during the RLC sessions. For example, some responses regarding improving future learning communities included the following:

> "I think a little more structure to the topics, so we had a little more guidance with that."
>
> "I would say I'd make things a bit more organized—I would have liked more structure in regards to preparing to write this paper."
>
> "If I could participate in another learning community, I would have liked to see more collaboration or communication between the different majors."

These opinions were not explicitly expressed during the sessions and illustrate an example of disconnection between facilitators and participants that could have been repaired in later sessions.

3.6. Overall Impressions from the Undergraduates

With an overarching goal to create an open and collaborative space for the members and facilitators of the relational learning community, it is important to share the overall impressions from the undergraduate students. Through the end-of-the-semester survey,

the SPED and psychology undergraduates were able to share their overall impressions of the learning community and to describe their overall relationships with the other members and facilitators of the learning community. Their opinions are important to help guide recommendations for future relational learning communities.

One theme that emerged from the survey results was the interdisciplinary dynamic of the RLC and the collaboration between the different majors. One psychology undergraduate commented, "I think working with a bunch of special education majors has been extremely rewarding for me as a psychology student. I love collaborating with other students and bouncing ideas off each other." Another undergraduate reflected on how the collaboration helped their own thinking:

> "Because of our learning community, this has been the most academically stimulating semester of my college experience. Not only do we have the perspectives of special education majors, but the perspectives of psychology majors, who helped bring in research and ideas to apply during tutoring. Collaborating with my learning community has taught me how to listen, be critical of my own work and thinking, match others enthusiasm, and how to appropriately challenge others. Overall, a learning community can provide a variety of majors with golden experiences which are not currently possible in our average curriculum."

One undergraduate expressed her appreciation for the interdisciplinary aspect of the RLC, returning to the overall goal of the learning community of discussing and collaborating on various cognitive theories and how they related to helping high school students with learning disabilities succeed in Algebra 1 by saying, "I think that the learning community was very beneficial in terms of combining multiple disciplines to better improve special education for the benefit of the students".

The members of the learning community were also asked about how to improve future learning communities and what topics and participants they would like to see in future learning communities. Regarding improving our approach to an RLC, a common theme that arose was the idea of having more structure, both on the topics discussed and on the overall learning community, such as in the following quotes:

- "more guidance on the topics,"
- "allowing the students to guide the conversation between the topics more often,"
- "make things a bit more organized . . . more structure [in regards to preparing to write this paper]".

This feedback illustrated that although having an open forum can be helpful for some sessions, creating a basic outline to structure each session and the entire learning community could help some of the members feel more successful. This would allow the members of the RLC to choose the topics while having the facilitators create a structure that allowed for each topic to be thoroughly covered. Along with ways to improve future learning communities, the undergraduates presented different ideas for future learning community topics and participants (see Table 1). Although many of the suggested learning communities involved only education and psychology majors, the topics were diverse and could vary depending on the professional goals of the members and facilitators of a learning community.

Lastly, the members of the learning community were asked to reflect on their overall relationships with the other members, facilitator, and co-facilitator of the learning community and how those relationships had evolved throughout the semester. There was an overall consensus that the members' relationships had grown and evolved during the RLC. A prime example of this evolution was expressed by an undergraduate who stated:

> "At first, the learning community was very friendly and willing to work with one another. We were nervous to challenge one another or speak our minds. After weeks of working with one another and getting to know everyone on a more personal level, the relationships have become more bonded. We talk with one another like we have been friends for life, sharing jokes and anecdotes. The

relationships that were built had made our meetings much more thorough and deeper, allowing us to interject and speak our mind when the time was right."

Other undergraduates expressed that they had "gotten much closer with everyone" and "strengthened [their] relationship with the other members that I had already established relationships with and was able to develop relationships with the rest of the members".

Table 1. Undergraduates' ideas for future relational learning communities.

Participants	Topic
Psychology and Education (versus specifically special education)	How to promote stress coping mechanisms in classroom environments
Psychology and Counseling	How socioeconomic status and race affect children's mental health, and what support systems could be available to students whose mental health is affected
Special Education	Autism and/or teaching elementary-aged students; forming relationships in the school environments for students with intellectual disabilities
General Education and Special Education	Creating strategies and scaffolding for students with learning disabilities in general education classrooms

4. Discussion

Based on a self-report, the second author was satisfied with the progress the group had made toward developing math interventions from an interdisciplinary perspective and was quite happy with the productivity of the group. The first author was successful regarding building community and promoting productivity through the RLC. She was able to strategically adjust the structure and location of the physical space, use structured and unstructured activities to build rapport and trust among the group, and gather feedback from RLC members to help her with decision-making. Both authors learned about how to gather feedback more frequently (and individually) and about the nuances of facilitating RLC meetings.

4.1. Comfortable Enough to Trust Each Other but Focused Enough to Be Productive

The strategic organization of physical space (e.g., table arrangement, combining both on- and off-campus meetings, etc.) to convey a balance of professionalism and yet maintaining a certain degree of comfort was likely important to our success [16]. We changed the format of our tables to a large U-shape so that we could all sit at the same table. We incorporated the use of a whiteboard for recording, combining, organizing, and re-organizing our ideas. Additionally, sometimes, we met at a conference room at a coffee shop to add some variety to our routines and reduce the formality to some degree by meeting off-campus.

Careful attention being paid to social interactions was important in this study. Shared meals seemed to support camaraderie among the group members [16]. These meals supported informal conversations to support the potential development of friendships or at least some amount of trust within the group. The first author varied the times of the meals, sometimes to establish the right climate at the beginning of a session and sometimes to create well-timed breaks when the group needed a break or when conversational repair needed to take place [26–28]. The first author also utilized a combination of structured and unstructured social interactions among the RLC members. She often relied more on structured activities (e.g., check-ins) earlier in the project and, later, more so on more informal and/or unstructured social interactions as she learned more about the nuances of the group and was able to facilitate rapport building among the group more subtly during informal conversations.

Often, our focus on both community building and productivity seemed to strike the right balance regarding our meetings being comfortable enough for members to share ideas and take risks, while still keeping the group focused enough to maintain productivity [16]. However, based on RLC member feedback, there were cases where we may have needed to have more rigid meeting structures such as by (1) being more explicit about how our meeting agendas would help us work toward our end goals and (2) providing more details at the beginnings of the meetings about what would be discussed. In addition to concerns about the structures of our meetings, RLC members also expressed the desire to have more control of the agenda items for the meetings. It is possible that gathering more input from RLC members on an agenda and being more explicit about the agenda items could have been beneficial.

Based on the second author's self-report, these RLC member concerns were likely about the second author, who admits that he may have seemed tangential (or maybe was tangential) in leading the more academic and formal conversations during RLCs; in some cases, he could have probably been more linear in his direction in the conversations. However, in other situations, the second author believes the conversations were strategically and tightly aligned with project goals which may not have been apparent to some RLC members or, in some cases, were in conflict with their individual goals. From the second author's (self-reported) perspective, balancing the control of the co-facilitator and the amount of "say" the RLC members had was a complicated challenge; getting "buy-in" and empowering RLC members was important, yet the project goals were sometimes not in line with some individual members' goals (e.g., what they wanted to discuss, what research or teaching methods they wanted to use, etc.) and the second author may have leaned toward being more authoritative than matched with the spirit of an RLC. It is important to note that second author reassured the RLC members that the ideas they expressed that drove the progress of the project were their "intellectual property" and that they would be given credit for them (and authorship; see Fleck, 2012) on forthcoming research papers. Additionally, of course, the second author values the input of the RLC members and will apply their feedback to his future work in RLCs.

4.2. The Learning and Progress of the RLC Members, Facilitator, and Co-Facilitator

The RLC members' written reflections and spoken feedback were both important for gathering information and planning and adjusting parts of the RLC meetings in important ways. The invitation of the RLC members to speak to the group each week provided valuable information for weekly adjustments, and the end-of-project survey completed by the members of the RLC provided the authors with key information for thinking critically about the structure of our learning community, how relationships matured throughout the entirety of our RLC, and how to improve future learning communities. In retrospect, weekly written reflections by each RLC member may have provided important information earlier in the project. RLC members may have been reluctant to voice concerns to the group that they would have been comfortable writing in individual reflections. Moreover, anonymous reflections might have provided even more useful feedback.

Despite some ways in which the facilitator and co-facilitator could improve, the RLC members reported learning a lot about each other's fields, how to think critically, and how to work together as a group toward a common goal. The variety of educational training and field experiences among the RLC members and our interdisciplinary structure were useful in combining principles from both fields to promote productive discussion. RLC members reported that they appreciated the opportunity to delve deeper into their own fields and related fields to build on what they were learning in their courses. One RLC member said she hoped more college students could have "golden experiences" like she had had in our RLC.

4.3. Implications for Practice

We recommend that RLC users pay careful attention to their work environments and how semi-recreational components of their work are integrated into RLC sessions (e.g., shared meals). The right conversation at the right time can be initiated and supported by a well-timed shared meal [16] to address the inevitable challenges that may arise when getting an interdisciplinary team to collaborate effectively [27–29]. It is also important that the members of an RLC have a common interest to discuss and learn about and/or a specific goal to accomplish, and that the diversity of the group is arranged strategically to promote progress toward group goals [16]. In addition to our group being designed to incorporate principles from psychology within education, researchers could strategically combine members of different fields in RLCs to study other real-world problems and develop potential solutions. For example, if special education professors want to learn more about social skills for students with autism spectrum disorder, they could recruit special education and speech language pathology undergraduates to collaborate on ways to teach social skills. General education and special education student teachers could collaborate in a relational learning community on how to better support students on an Individualized Education Plan (IEP) in the general education classroom.

RLC users should also consider how to utilize physical space regarding how to set up tables to promote collaboration and how to mix more formal and less-formal settings (e.g., on- and off-campus) to balance rapport building and a more rigid focus on getting more done on certain days, and look for other ways to promote a sense of professionalism with some degree of comfort that promotes productive discussions [16]. Additionally, RLC users can consider how to weave team building and confidence building exercises into sessions (e.g., using check-in questions) to help people get acquainted with one another, learn about other members' expectations for the relational learning community, and establish rules for the group in ways that are disarming such as in casual conversations during more informal times in group meetings. However, in some cases, it can be productive to simply and directly ask people to comment on how they feel about an RLC [16]. If things get tense, RLC users can change the momentum with a break, maybe include a meal or a snack, or just ask group members to talk about things outside of the group (e.g., plans for the weekend). Conversations about meals, along with finding out key information such as food allergies, can lead to light-hearted conversations about food likes and dislikes to reduce tension in the room if needed or to just take a break from more cognitively demanding work when RLC members are mentally tired and need to re-charge.

RLC users can use different types of reflection to gather feedback from group members, sometimes individually and sometimes as a group, and should consider using at least one of these types of reflection per session. Each have different strengths: individual reflections are good for anonymous feedback that is specific and personalized to each individual, while group reflections are sometimes better when helping to see how group members feel out in the open or how they may build on each other's thoughts. Sometimes pre-determined reflection topics are useful and sometimes RLC users may benefit from letting group members reflect on their own topics. Information gathered from reflections can be useful for planning future sessions and making adjustments during sessions regarding choosing a topic of focus or repairing conversations as needed.

4.4. Limitations and Implications for Future Research

This study was small-scale and exploratory in nature and its findings are not generalizable. The data collection and analysis could have been more thorough, including more member checks and the use of more external auditors to check reliability and validity. Additionally, due to the power dynamics (regarding the undergraduates being employed by and, with the education majors, taught by the co-facilitator), it is possible that the college students may have been hesitant in some cases to be critical of the project. We also relied on subjective feedback from participants as well as "self-report" from the co-facilitator; while informative, this type of data is subject to bias.

Yet, these preliminary findings provide some foundational information and could be applied to larger studies and research in other contexts. This study was conducted with a purposefully sampled group of undergraduates who had demonstrated some prior success working for and/or being students of the second author; this group was constructed with relatively high achievers. Future RLC research could be focused on working with education and psychology majors who have not yet demonstrated this degree of success and may warrant different techniques and adjustments from facilitators. However, purposefully sampling high achievers for RLCs may be a worthwhile approach for working toward solutions for some more challenging problems wherein combining more talented, experienced, driven, etc. college students may be more appropriate.

The productivity of our RLC and others RLCs in prior research [16,17] suggest that important learning can happen for college students in RLCs and that this learning may potentially be applied in positive ways for members of the community (e.g., K-12 students, patients at mental health clinics, etc.). For example, the math interventions delivered by the education majors during tutoring sessions were improved by the work in our RLC. Future researchers should study how different skill sets of college students can be combined to support both these students' growth as important future members of their communities and/or researchers as well as the development of interventions that can make positive differences for practitioners and those that they serve, teach, counsel, etc. in the community.

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