Exploratory Reading Groups: A Scalable Approach to Creative, Relational, and Student-Driven Exploration in CS Education

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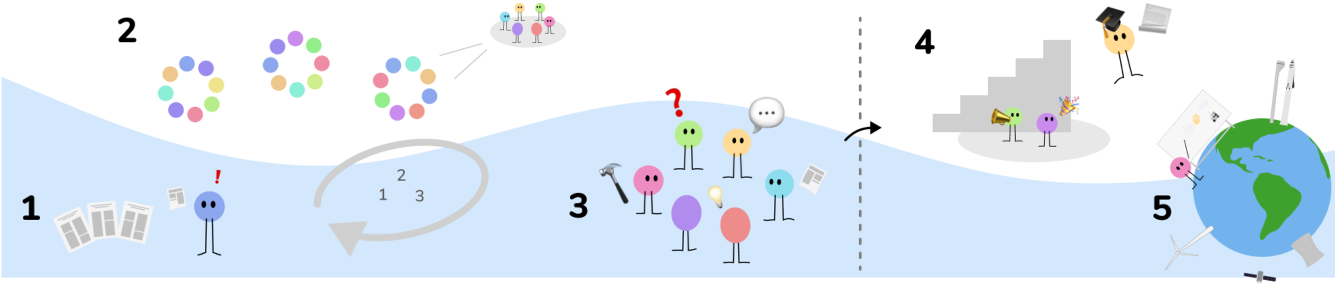

Figure 1: Twice each quarter, 1) students browse themes relating CS to society, 2) form four-week, low time commitment, student-driven reading groups, and 3) stretch their imagination by exploring new ideas while building relationships through short activities. This has led to 4) greater clarity and confidence in career goals, supportive peer relationships, and a sense of belonging, each of which are important for 5) our ultimate goal of supporting a diverse and creative workforce.

ABSTRACT

Most CS education initiatives focus primarily on teaching raw computational skills and domain knowledge. While this is certainly important, it ignores the creative and real-world aspects that are needed for applying skills to societal problems, and for attracting more diverse populations of students. One way to impart this type of learning is through undergraduate research. Unfortunately, these opportunities are limited and hard to scale due to their need for mentorship. In this paper, we introduce *exploratory reading groups* as a way to support creativity and intrinsic motivation in a scalable manner. In contrast to graduate journal clubs, exploratory reading groups are designed for broad exploration of ideas, and their lightweight, student-driven nature makes them easily scalable. We present design patterns for structuring groups learned over a two-year time period of running and iterating on exploratory reading groups through a user-centered process. This time period saw the program grow from a group of 6 students to having served over 260 students, all participating completely voluntarily. In surveys and interviews of participants, we found that students valued the experience tremendously, but that successful exploration took on diverse meanings. We found that surprisingly strong relational ties developed from a simple intervention, and describe three clusters of participant motivations and experiences that emerged.

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CCS CONCEPTS

• **Social and professional topics** → **Computational science and engineering education**.

KEYWORDS

exploratory reading groups; creativity; relationships; motivation

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1 INTRODUCTION

To meet the growing demand for computing professionals across nearly every industry [3], corporations, governments, and nonprofits have organized to introduce initiatives aimed at improving CS education [1, 7, 31]. Most do so by teaching computational skills or domain knowledge such as programming and algorithms [2, 7, 15]. However, while these are undeniably important, many have noted that developing the creative ability to apply CS skills to real-world societal problems is equally critical for the computational workforce of the future [6, 24, 33]. Efforts to teach raw skills and domain knowledge need to be matched with efforts to foster curiosity and motivation, especially critical for broadening computer science to larger and more diverse populations, who tend to be better motivated through purpose-driven learning [13, 19]. One way to impart this type of learning is to through undergraduate research. But this is hard to scale due to the difficulty of finding mentors willing to commit the necessary time [21]. *How might we foster creativity and motivation in ways that are also scalable to broad populations?*

In this paper, we introduce *exploratory reading groups* (ERGs) to meet this need. In contrast to typical reading groups which focus on depth, exploratory reading groups are designed for broad exploration of ideas to stretch creativity and motivation, and extremely lightweight, student-driven participation to enhance scalability. Our model evolved over a two-year period of running and iterating on our program through a user-centered design process, which saw it grow from 6 students in a quarter to over 50 students in a single 4-week period (a total of 260), all participating completely voluntarily. We conducted surveys and interviews during this process to understand student motivations, experiences, and derived value. We found that students valued the experience tremendously, but that successful exploration took on diverse meanings; that surprisingly strong relational ties developed from a simple intervention; and that participant motivations and experiences could be roughly described in three clusters. The remaining sections detail the design patterns we developed and the themes that emerged.

2 READING GROUPS & OTHER PROGRAMS

Reading groups are a form of active, small-group learning that have been used in the humanities, social sciences, biology and medicine for well over a century [8]. They promote autonomous learning, heighten critical insight and increase student communication, data interpretation, and confidence [11, 20, 28]. In medicine, they have been shown to improve knowledge, reading habits, and the use of literature [9, 18]. However, despite research showing that active [16], small-group [32], and peer [5] learning are also important for STEM (e.g. for outcomes such as academic achievement, retention, and attitudes towards learning), reading groups are not commonly used in CS education, which has instead focused on programs for project-based learning (PBL) such as realistic PBL experiences [12, 26], Research Experiences for Undergraduates [25, 27], and informally, hackathons [23, 29]. We are aware of a few cases like MIT's Undergraduate Reading Group Experience (URGE) [36], but they are no longer active and there are no studies on their use.

Our reading groups also differ significantly from typical reading groups in their focus on exploration. Typical reading groups are modeled after graduate journal clubs with a focus on in-depth analysis, discussion, and critique, with participants reading before meetings and coming ready to discuss. Neither of these are true for our reading groups, which instead center on *stretching one's imagination in a lightweight, low-pressure environment*, which has enabled us to obtain traction among our CS students.

3 RESEARCH METHOD

Our research followed an iterative user-centered design process in which we evolved our program by repeatedly running it, using observation, surveys, and interviews to understand the resulting experience, and then updating our model accordingly for the subsequent round. Beyond the obvious design objective of enhancing the educational quality and student experience, we also designed for scalability, i.e. to make it easy to operate and participate in.

Study Procedure

Our program was run at a large public research university. It was open to all, but mainly advertised in engineering channels such as the engineering newsletter or flyers in engineering buildings. Our process followed the timeline for each phase, which was initially one quarter long before a reduction to four-weeks later on.

Interested students filled out an RSVP survey for a launch session, which collected demographic information (e.g. year, ethnicity, gender, major), their motivation for joining, and their topical preferences. Undergraduate research assistants from our team joined as participants in whatever topics they were most interested in so that their participation was as natural as possible. This embedded the research team within the ERGs as participant-observers where their observations were logged as field notes. At the end of each phase, participants completed an exit survey asking them to rate their experience, to reflect on their initial motivation for joining and whether or not it was fulfilled, and to provide feedback on what they liked and what they would have changed. After multiple iterations, we conducted and analyzed 7 semi-structured interviews of undergraduate students to develop a richer understanding of the student experience, each around 30 minutes. We chose participants who expressed willingness in the exit survey and who covered a range of experiences or had positive or negative experiences we wanted to dig into. Beyond questions related to our design objectives, we were also guided by two research questions: *1) What were the motivations and experiences of participants, and could they be described by a few representative segments? 2) What value did students derive, especially as related to creativity and motivation?*

Data Analysis

We used the exit survey responses to define our interviews, which were transcribed and coded using a combination of descriptive, process, values, emotion, and judgment coding [30]. For each interviewee, we used codeweaving of the descriptive and process codes to generate narratives of the various scenarios covered in the interviews which ranged from the individual's overall context to their discovery and participation in the reading groups, and we used codeweaving of the values, emotion, and judgment codes to develop a deeper picture of the individual's motivations and experiences. We then used codemapping to organize codes into themes under two areas. The "persona and setting" themes aimed to help us understand the attributes and motivations of individuals for defining user segments, while the "value propositions and journey" themes aimed to help us understand the perceived value of the reading groups and participant experiences. Finally, all team members discussed and resolved disagreements around the codes and overarching themes. As we describe in Section 5, beyond the themes directly relating to our research questions for identifying clusters of motivations and experiences, and for understanding the value derived, we also found that relational aspects were a significant part of the reading group experience.

4 EXPLORATORY READING GROUPS

The program structure

Our program operates in four-week long phases, two per quarter (**Figure 2**). The first week is an in-person launch session, where students learn about the program structure, our goals and expectations, and the available topics. After forming groups of 6 to 9 students, each group spends time getting to know each other, determining

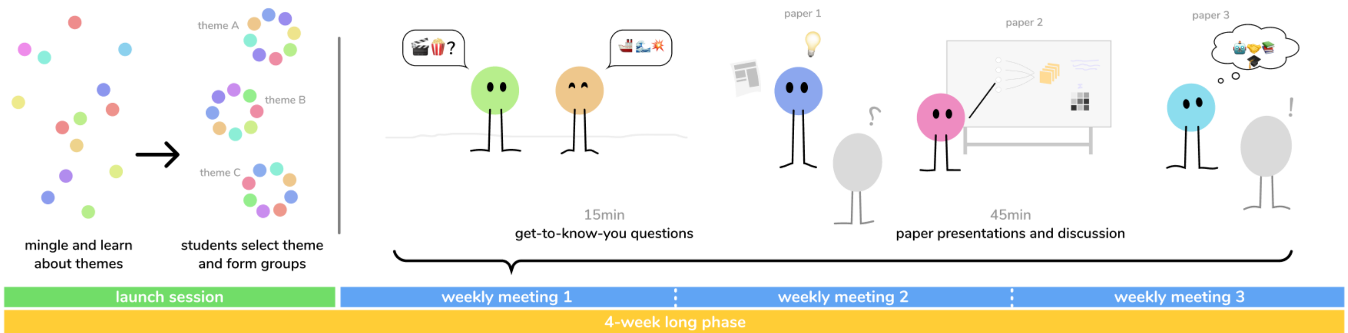

Figure 2: The ERG program occurs over four-week long phases starting with a launch session for forming groups, followed by three one-hour meetings for building relationships, and for exploring and discussing ideas.

meeting times and locations, and scheduling paper presentations. In the remaining three weeks, students meet with the same group for one hour per week. The first 15 minutes are spent on "get-to-know-you questions" chosen by the presenters. The remaining 45 minutes are spent on presenting and discussing papers. Since each person presents one paper per phase, and since each group has 6 to 9 people, there are 2 to 3 papers per meeting, meaning as little as 15 minutes per paper. Each presenter spends 5 to 7 minutes concisely summarizing the key ideas of the paper, leaving the remaining time for questions, reactions, ideas, and brief discussions.

Designing reading groups for exploration

The purpose of exploratory reading groups is to support exploration, stretch creativity and increase motivation. To do this, we designed ERGs to expose students to many ideas, to increase student agency and purpose, and to facilitate stimulating discussions with peers.

Breadth over depth. What surprises people most when hearing about our program is the number of papers and relatively short time per paper. Unlike typical reading groups which discuss papers in great depth, we intentionally chose to emphasize breadth, and an increased exposure to ideas for supporting creativity [17]. Discussions do not focus on critique (or even on in-depth understanding). Instead, the focus is on understanding just the core motivation, insights, and methods; on lessons learned for design; and on speculative imagination of new ideas. This makes the reading groups engaging even for students not aiming to do research.

Student agency. Rather than predetermining the reading list and discussion structure, we emphasize student agency, an important factor for enhancing motivation [14, 22]. Our design choices exemplify free choice learning [10]: students choose the themes that interest them, determine when and where they meet, pick the paper they present, and have significant freedom in how they present and direct discussion. Greater agency makes students more likely to follow through and engage, and enables more self-relevant experiences that help students synthesize new learning [35].

Purpose in learning. We also define the topics themselves to be more relevant to the average student. Besides a methodological orientation (mathematical, data, design) or a research community (HCI, AI), topics also have a human or societal theme (democracy, education, incentives, collective action, crowds, social good, networks, communities). This creates greater purpose for learning, which fosters motivation and self-regulation [37] along with agency.

Peer relationships. Intentionally carving out time for get-to-know-you questions also helped to foster peer learning relationships [5] that led to more stimulating discussions and greater motivation. The activity itself was fairly straightforward: each presenter would pick a question for everyone to answer. However, we emphasized questions for getting to know each other ranging from the typical check-in ("How was your day?") to understanding long-term goals ("Where do you see yourself in 5 years?") or even vulnerable questions ("When was the last time you cried?").

Appropriate guidance. We briefly note that increasing breadth, student agency, purpose, and peer learning does not imply complete freedom or lack of guidance. The themes themselves were determined by faculty, and rather than having students choose papers from conference proceedings (which was overwhelming for them), we gradually converged to picking 1 to 2 representative faculty per theme that students could pick papers from. We also created a guide to introduce students to how to read papers and what to look for (motivating context, key insight, demonstration of idea, etc). It also provided them with examples of get-to-know-you questions and discussion topics (insights for design, cool tools, new ideas, etc).

Designing reading groups for scalability

We also designed with scalability in mind. This meant finding ways to reach more students, provide sufficient value for their time, enhance stability in participation, and minimize operational load.

Advertising intrinsic and extrinsic motivators. While our initial advertisements targeted intrinsic motivations (such as learning new ideas and building relationships), we found that there were several extrinsic benefits to participation and that many students cared a lot about these. Describing how ERGs led to research positions or provided content for job interviews helped to attract participation.

High value-to-work ratio. Our program was not a high priority for students. This made it important to provide a high amount of value for the time spent. We did this by only requiring participants to read *a single paper per phase*. Non-presenters were *not* required to read outside of meetings. For this small time commitment, participants benefited from the many presentations prepared by others. While this would not have worked for the traditional reading group centered on depth, it was effective for broad exploration.

The value-to-work ratio also explains the importance of small groups and why we aimed for a group size of 6 to 9. Having at least 6 members meant that there could be at least 2 papers per meeting. Having at most 9 members preserved the intimate environment that was critical for discussions and peer relationships.

Stable participation. Several of our design choices were aimed at addressing stability, which was a major challenge for the program. The most surprising of these was the value of simply splitting each quarter into 2 phases. In early iterations, groups were extremely fragile. If a student dropped out in middle (say, around midterms), this often led to another student dropping out, and then to the end of the entire group. This was almost entirely solved by splitting into 2 phases. We suspect that it made it easier for students 1) to assess their time before joining, 2) to push through if they found themselves too busy, and 3) to leave at the end of the first phase without impacting others. What was even more surprising was that this also resulted in more people completing the full quarter. It seems like it was psychologically easier to recommit in small chunks than to maintain a single large commitment.

Another challenge was even getting the group to start meeting after formation. While scheduling seems trivial, it often stalled and kept groups from starting. This was solved by having an in-person launch session and by having groups finalize logistics (meeting time, location, presenter schedule) before leaving. Groups that did so always succeeded, while those that did not almost always failed.

The launch session also contributed to stability in other ways. The faculty PI set norms by stressing the importance of following through if they chose to join and made sure that students understood what they should expect when committing to a particular theme. The in-person launch filtered out those less motivated by making them invest a minimal amount of time and creating sunk costs (though it may have created a barrier to participation). Finally, meeting in-person likely created social cohesion that encouraged participation. Virtually all students that came ended up joining.

Resource light operations. Our program is designed to be almost entirely student run. Faculty are only needed to define group themes, run the launch session, and optionally, collect feedback. Groups are provided with a guide for almost all parts of the program and choose a group facilitator so that someone has the responsibility and authority to make sure that presenters pick their paper and create a summary, and to keep group discussions on schedule.

5 FINDINGS

Our interviews and analysis helped to elicit a rich understanding of three key areas: what successful exploration meant, the impact of relational features, and major clusters in student experiences.

Successful exploration has diverse meanings

Almost all of our students valued their experience. However, what successful exploration meant differed across individuals.

Creative stimulation and idea generation. For some students, successful exploration meant being exposed to interesting ideas that could be creatively applied to defining new projects or evolving existing ones. Aaron, for example, chose to join the "HCI/Design Process" group because it could *"help inform"* a project that he was working on. In reflecting, he described how the ideas he was exposed to helped spark new ideas for implementing his project:

> *"there is huge potential for incorporating all these really really awesome tools and design elements... in our reading group there's this presentation [about] the importance of visual complexity and color... it was just informing a lot of my ideas of creating open courseware. . . , [it's] been super influential in the way that I'm structuring [it] in my mind..." (Aaron:Go-getter[1])*

These ideas came from both the paper presentations and his peers. When asked about his *"biggest highlight"*, Aaron answered:

> *"...the discussions... when people talked about their ideas, where we kind of explored the idea... and pulled it apart. . . " (Aaron:Go-getter)*

Fueled by an intrinsic interest in the topic, and supported by guides and group discussions, Aaron benefited from exploring and applying new ideas to his own creations.

Discovery of personal connections and purpose. Beyond the value derived from direct exposure to ideas, we found that there were also many other forms of successful exploration. One of these was the discovery of personal connections to academic content, and more broadly, the development of purpose for learning. Amir describes his surprise at discovering this connection:

> *"I didn't expect to learn like, such interesting topics that, like, I personally cared about." (Amir:Explorer)*

Amir's surprise hints at the gap that commonly exists between the technical aspects of CS education and personally relevant practice. Amir continued, describing a specific topic that stuck with him:

> *"...there's something about. . . using technology to help... immigrants. . . integrate more with the economy... I really liked that aspect of it. Because I noticed being a first-generation Persian American there is a lot of separation... with your neighbors or your friends..." (Amir:Explorer)*

We note that the student did not describe technical details. The value they derived did not come from diving deep, but from exploring broadly and discovering personal connections to how CS is being used in practice. This helped him shift his perception of CS from primarily technical to a personally meaningful, purpose-filled view.

The joy of sharing small wins and teaching others. Exploring within a small-group environment also created another form of success: the joy and relational connections from sharing small accomplishments and knowledge with others. Zack told us about the initial difficulty he had reading his selected paper, but how he ultimately overcame this, which resulted in a greater understanding:

> *"...at first it was really hard for me to understand how they did it... and then after I just kept reading it, then it was like 'Woah, I kind of understand it' like 'this is pretty cool'..." (Zack:Go-getter)*

[1]These refer to the three major segments described in the final subsection.

Zack's success made him excited to teach his peers. Propelled by his small win, Zack recalls spending five hours working on not only preparing a summary (what we require), but also preparing a PowerPoint and whiteboard demonstration:

> *"...so during the meeting when I shared my paper, I showed them a PowerPoint, not just the summary, and then I also gave them a demo of how that algorithm works… " (Zack:Go-getter)*

The group provided Zack with a platform to share small wins, and gave him an additional purpose for learning: teaching others.

Confidence and clarity in career goals. Finally, students also experienced successful exploration in the form of greater confidence and clarity around their major or career goals. For Cody, this came from the context he gained about research itself. We interviewed Cody in his first quarter of college after four weeks in our program. Naturally, he had low confidence and clarity about his goals:

> *"I don't feel entirely comfortable getting a job as of right now… so I think it'll be better to go explore, get a solid base… There's also, potentially, I might want to get into research too..." (Cody:Go-getter)*

But after eight more weeks in our program, when we asked, "Has anything changed since I last talked [about career goals]?", he said:

> *"I feel a lot more confident with research, I think that's probably where I want to go." (Cody:Go-getter)*

Amazingly, after just a few months of participation, Cody went from perceiving CS research as an afterthought, something he *"might want to get into"*, to developing confidence in a clear career direction. He explained that the reading groups showed the greater context of CS research and how it could be applied to diverse fields *"...from cyber security, to poaching and environmental… stuff"*. This was also true for those without research goals such as Emma:

> *"...the people that I was in a reading group with [were] very confident about their choice [to pursue CS]... I learned that CS is applicable to a lot of different fields... [it] definitely cast a positive light on what I think about CS... I always thought CS was intimidating... but now I'm more open to it." (Emma:Explorer)*

It is important to note that in Emma's case (and in Tiffany's, as we will see in the following subsection), greater clarity and confidence was facilitated by the community and a sense of belonging.

Simple relational features can have a big impact

We were surprised to find that our simple get-to-know-you questions had a big impact on relationships, which in turn contributed to a greater sense of belonging and peer support.

Comfort and a sense of belonging. Students found the get-to-know-you questions valuable because it allowed them to feel socially at ease and to connect more personally with one another:

> *"I think that the [questions]... were really important as far as helping me settle into the group and kinda get to know people, and it really contributed to the laid back feel for sure, which was a really positive thing..." (Aaron:Go-getter)*

> *"I really liked my group because we were just able to joke around and have fun…, one of the questions was like, 'What was your most memorable Halloween?' ...and we all had like, a funny story about our Halloweens, and we could all make fun of each other." (Tiffany:Explorer)*

In these cases, the students even felt comfortable enough to *"make fun of each other"*. But this sense of belonging was not just at the *interpersonal* level. For Tiffany, the relationships formed helped her develop a sense of belonging [4, 38] within her *field of study*. Tiffany was a cognitive science major. She described how interacting with CS majors helped her to gain interest in the AI concentration of her major and to feel a sense of belonging in the CS community:

> *"...all of the people in my group were studying CS or had a background in CS. I think they made me gain interest in the AI concentration in Cog. Sci. Because before, I was like 'Oh I don't know… ' (unsure of AI). But like, since they were talking about all the classes they were taking, it felt like they… I don't know... it was a community I liked being a part of." (Tiffany:Explorer)*

The relationships formed facilitated Tiffany's entry into a new field of study and gave her clarity and confidence in her career goals.

Peer Support. In addition to catalyzing a sense of belonging, the relationships formed also became a source for for both academic and emotional peer support. Cody shared his experience getting advice from other freshman and feeling *"close enough"* to ask the graduate students in his group for help:

> *"...with my new group, we're all freshmen so we're like constantly bouncing questions back on each other, like 'How is this class?', 'What's your plan?' My last group was a little more of a stretch, because it was like, I was a freshman, and there [were] like two grads, two juniors, it was a bit more of a gap, but I felt close enough to them to ask for help on stuff." (Cody:Go-getter)*

Cody also shared an instance of emotional support that his group offered to a graduate student, illustrating that group members supported each other at a personal level across life stages:

> *"One of the grad students would [often say], 'Yeah, I just wonder why my life sucks so much, hahaha.' 'Yo buddy, you wanna talk?' We would just talk afterwards, it wasn't like super in depth, not any concrete things, but it was just kind of like a moment like, we're there. I think we're getting pretty close." (Cody:Go-getter)*

This support occurred organically, and illustrates how ERGs went beyond merely teaching students to creating a space for fostering rich relationships, a sense of belonging, and peer support. Our relatively simple, almost tangential, feature took on a much larger and more valuable role than we anticipated.

Three clusters of motivations and experiences

Although there was a wide range of value gained from ERGs, student motivations and experiences tended to cluster into three segments: *Go-getters*, *Explorers*, and the *Career-focused*. Here, we describe each, and discuss potential implications for improving ERGs.

Go-getters. The Go-getter is an intrinsically motivated, self-driven learner. They seek out opportunities to stretch their knowledge and advance their career ambitions. They have a plan, or at least a direction, and evaluate opportunities based on this plan. Go-getters tend to be on top of their coursework, and may be engaged in self-initiated side projects. This was reflected in why they joined:

> *"I had an idea it would be fun to read papers with people and explore topics..." (Aaron:Go-Getter)*
>
> *"I was definitely in the market for additional reading." (Aaron:Go-getter)*
>
> *"...just keeping an eye on the new emerging stuff… like doing research later on you have to know like what has already been done." (Cody:Go-getter)*
>
> *"I had done [something similar] in high school... so it was like 'Yes, totally!' I want to get a more research version of this... I was like 'LET'S GO!'" (Cody:Go-getter)*

ERGs provide value to Go-getters by helping to catalyze new ideas and opportunities. Aaron found new ideas for his project, Cody clarified his career direction, and Zack hoped it would help open opportunities for research positions.

Within the groups, we've observed Go-getters contributing to an excited group culture by being very engaged in discussions, coming up with new ideas, or "going the extra mile" in their presentations. This may have implications for designing group compositions for better peer influence and student learning [34]: strategically placing Go-getters into groups may help motivate less enthusiastic students.

Explorers. Like Go-getters, explorers are intrinsically motivated, but they aren't looking for a specific outcome or to fulfill a plan. Explorers often join precisely because they *don't* have a plan and are trying to explore what's out there. They tend to be in an early phase of their education, be undeclared, or interdisciplinary. Unlike Go-getters, who keep their eye out for opportunities and find us in the newsletter, Explorers are more likely to find us by chance, through flyers, tabling, or word-of-mouth. Explorers say:

> *"[I didn't] have… certain expectations… just wanted to be exposed to more research." (Tiffany:Explorer)*
>
> *"...still keeping [my] options open… [I wanted to bring my] enthusiasm to learn something new." (Emma:Explorer)*
>
> *"[I joined after a friend recommended it, though] when I first heard of it, I didn't really have an idea [of what participating meant]..., it was just like a place to be social but also a place to like learn things." (Amir:Explorer)*

Success for an Explorer often relates to developing a greater sense of clarity, confidence, or belonging. As they develop a career goal, obtain understanding in a domain, and create community connections, they may transition into Go-getters or the Career-focused.

Explorers also contribute to the group environment, but in a different way than Go-getters. Due to their focus on relationships and exploration, they can contribute to a more comfortable social environment and/or one that is *"open to asking [for clarification]" (Tiffany)*. Having many Explorers in a group could potentially enhance belonging or learning. We also note that both of our female interviewees were Explorers (though this could be coincidental). Since underrepresented groups don't have as much prior exposure to CS, they may be more likely to be Explorers, making it especially important to design the groups to meet the needs of this segment.

Career-focused. Unlike Go-getters and Explorers, the Career-focused are extrinsically motivated. Though they are also oriented around a goal (like Go-getters), this goal is not coming from intrinsic interests, but from the pressure to find a job and concerns about their prospects. Like medicine, they engage not because it tastes good, but because they think it is good for them, and because they are such a low time commitment. Our one Career-focused interviewee, Steven, explained that he had heard about our program a year ago, but felt *"overwhelmed...so didn't do anything."* He also said:

> *"...there were four different topics, so I didn't know which [to choose]..., so I just chose a random one." (Steven:Career-Focused)*
>
> *"It's pretty cool that I can learn about research papers without reading... if it gets too much then I might drop out." (Steven:Career-Focused)*
>
> *"I didn't really enjoy presenting because I got too nervous... but I need this practice." (Steven:Career-Focused)*

Despite having a lower level of intrinsic interest, Career-focused individuals do end up learning and engaging. Steven found himself making connections to his classes, *"...thinking [of] all the things I learned."*, and also talked about a paper on trust in the sharing economy, and its relevance to getting a job: *"I thought that was pretty interesting, if in the future I work for Airbnb or Uber."*

Steven, and others like him, reminded us that extrinsic motivations are also important for reaching more students, and led us to reframe our advertisements as discussed earlier. Our hope is that ERGs can meet extrinsic needs while also helping to stretch creativity and strengthen relationships for a broader population. A future direction is to explore variations of ERGs centered on skill-building, which may be more attractive to the Career-focused.

6 LIMITATIONS

We note that our reading groups were cocurricular, which means that our participants were intrinsically motivated. Implementing ERGs in the context of a graded course could potentially reach more students, but would require new designs. We also note that results could also be affected by our particular institutional context and the fact that we had research team members in most of the groups.

7 CONCLUDING DISCUSSION

In this paper, we introduced exploratory reading groups as a way to foster creativity and motivation in a manner scalable to broad populations. We discussed how our designs evolved to support exploration by emphasizing breadth over depth, student agency, purpose in learning, and peer relationships, and how we scaled the program by advertising for intrinsic and extrinsic motivators, creating lightweight but high-value experiences, and designing for stable participation. Our findings make us hopeful that ERGs can be valuable at other institutions, and we have created resources to support broad adoption at tech4good.soe.ucsc.edu/#/collectively. We hope that this paper will facilitate the implementation of ERGs broadly and that it will inspire new programs designed for both educational impact and lightweight, scalable participation.

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