



From Individual Change Agents to ‘Revolutionary’ Teams: The Search and Selection Process of Team Formation within a Community of Practice

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Abstract

While the role of teams in leading transformations within academia is increasingly recognized, few studies have analyzed how teams form. Understanding the processes of interdisciplinary team formation within higher education will allow leaders to intentionally bring together individuals and form teams with higher likelihoods of success. In this study, we examine the early stages of change team formation within higher education, specifically looking at the two interconnected processes of search and selection, and we explore how a community of practice influences these processes through situated learning. Our longitudinal qualitative analysis demonstrates how teams form and transform over time, from the initial search process for team members to the factors that informed the initial and ongoing selection of team members. We find that a community of practice influenced these processes by shaping how teams understood their instrumental needs and how members understood their role within interdisciplinary teams. Finally, we examine a correlation between leadership structure and team member turnover, finding that a centralized leadership structure that lacks a vision for change shared among team members may drive turnover. The results provide insights into the dynamic nature of change team formation within academia.

Keywords Team formation · Community of practice · Institutional change · Change agents

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Introduction

The role of teams in leading transformations of higher education is receiving increasing research attention, but very few studies have looked at how change teams form within academic settings (Caldwell, 2003; Scheidgen, 2019). As the success of a team is highly dependent on team composition, team formation is an important factor in the success of change projects (Bercovitz & Feldman, 2011). Understanding the process of team formation within academia will allow academic leaders to intentionally bring together individuals and form teams with higher likelihoods of success.

We define change teams as a group of individuals who are working together with a common purpose toward a collective goal of organizational transformation with shared responsibility for the outcomes (Bercovitz & Feldman, 2011; Hsu et al., 2016; Olmstead et al., 2019). Most prior research on team formation is focused on work and entrepreneurial teams—few studies look at change teams within academia. In this paper, we examine the early stages of change team formation within higher education, specifically looking at the search and selection processes.

Team formation is an ongoing process in which team members may both join and leave the group (Aldrich & Kim, 2007; Bailey & Skvoretz, 2017; Klada, 2018; Scheidgen, 2019). Prior research has identified search and selection as two key processes within team formation (Aldrich & Kim, 2007; Hinds et al., 2000; Klada, 2018; Scheidgen, 2019). Individuals form teams by initially conducting a **search** process to identify potential team members (Aldrich & Kim, 2007; Klada, 2018; Scheidgen, 2019). Teams form through the intentional **selection** of individuals predicted to have a high level of success, to reduce uncertainty over the project and outcomes (Hinds et al., 2000). During the longitudinal process of team formation, decision-making about member selection evolves as new information about the team and project are acquired (Klada, 2018).

Search Process of Finding Potential Team Members

During initial stages of the search process, the search for team members primarily occurs through interpersonal relationships and social networks (Aldrich & Kim, 2007; Klada, 2018; Scheidgen, 2019). In a study of the formation of entrepreneurial teams, Scheidgen (2019) compared the process between independent start-ups and university spin-offs, and found that the initial search process for team members was driven by social ties—both friendships as well as prior working relationships. Within the academic setting, Scheidgen (2019) found a second pattern of team formation in which a single individual leads the initial team formation processes and searches for team members via their scientific network.

Over time, the search process continues as teams enlarge in size and/or seek new members as original members leave the team. Adding new team members potentially changes the culture and direction of the project while altering the human capital available on the team (Forbes et al., 2006). Smaller teams are more likely, relative to larger teams, to add new members to increase human capital within the team (Ucbasaran et al., 2003). Additionally, heterogeneity in regard to prior experience is correlated with team members exiting the team, as this heterogeneity may lead to

power differentials within the team and thereby lower team cohesion (Ucbasaran et al., 2003). The convenience or cost of searching for new team members also plays a role in the enlargement of teams; however, social networks provide inexpensive and trusted sources of information regarding who may be a good fit (Forbes et al., 2006). Once potential team members have been identified via the search process, the next stage of team formation is the selection process in which individuals are invited to join the team from the total pool of potential members.

Selection Process of Team Members

The factors impacting the selection process are generally sorted into two categories: social psychological criteria and instrumental criteria (Aldrich & Kim, 2007; Forbes et al., 2006; Klada, 2018; Scheidgen, 2019). Social psychological criteria for selecting team members include affect and familiarity. Affect refers to using one's affinity or aversion towards an individual as selection criteria; that is, folks are more likely to select someone they already like as a team member (Bailey & Skvoretz, 2017). Familiarity refers to selecting team members based on prior working relationships and pre-existing social ties (Bailey & Skvoretz, 2017; Hinds et al., 2000; Lungeanu et al., 2014; Ruef et al., 2003). In one of the few studies of teams within academic environments, Lungeanu et al. (2014) found that researchers are more likely to work together on interdisciplinary teams if they have prior working relationships; they suggest that individuals prefer choosing team members that they've worked with previously as a mechanism to reduce uncertainty in collaboration behavior. Instrumental criteria for team formation focus on competency-driven decision-making during the selection process (Forbes et al., 2006; Scheidgen, 2019). Instrumental criteria are skill-based, in which team members are added to ensure that the team possesses all the necessary skills to complete the project (Hinds et al., 2000). Reputational information about abilities and work habits may be used to identify what skills individuals will bring to the team (Hinds et al., 2000).

In the initial selection process of team formation, social psychological criteria dominate as individuals are found via their social and professional networks, as there is an assumption that members of one's professional network would have the skills needed (Klada, 2018; Ruef et al., 2003; Scheidgen, 2019). Instrumental criteria become more salient during the enlargement stage, as the team gains a better understanding of the skill and competency needs (Klada, 2018). However, both types of criteria are present in both stages (Aldrich & Kim, 2007; Forbes et al., 2006; Klada, 2018; Scheidgen, 2019), and are inherently shaped by the context in which the team forms and functions. Higher education is structured as a professional bureaucracy where individuals who are highly specialized are used to working autonomously within a set of standard procedures, constraints, and hierarchies (Culver et al., 2022; Mintzberg, 1979). This structure helps academic institutions operate successfully, but may also influence interdisciplinary teams' search and selection processes. The formation of a team that aims to transform higher education may be more challenging than in other contexts, in part because the bureaucratic reliance on structure and hierarchy perpetuates silos, fosters a culture of risk aversion, and may limit creative solutions (Culver et al., 2022).

Communities of Practice

The processes involved in search and selection suggest that team formation occurs through situated learning. That is, as teams form and evolve over time, members come to better understand the different roles and skills needed. One important context in which collective learning occurs in academic settings is communities of practice: spaces designed to facilitate regular interactions among people in a shared area of expertise (Scheidgen, 2019; Wenger, 2008; Wenger & Snyder, 2000). Within a community of practice, members share their knowledge with an intention to advance their field of practice (Hakkola et al., 2021; Wheatley & Frieze, 2006).

There are communities of practice aimed at higher education change (Kezar et al., 2017), which support faculty learning around pedagogy reform and provide a space for their participants to share new ideas within and across institutions (Gehrke & Kezar, 2017; Kezar & Gehrke, 2017). While information is limited on how community interactions would contribute to changemaking across academic institutions (Gehrke & Kezar, 2017), it is expected that participants learn from each other's changemaking strategies (Gehrke & Kezar, 2017). Similarly, we hypothesize that being involved in a community of practice could inform how faculty change agents learn to form change teams.

Communities of practice may be especially relevant for learning that is situated in specific contexts, allowing the individuals involved to co-construct the knowledge that they need to be successful within their field (Hoadley, 2012). Through this exchange of information and creation of knowledge, members may develop and implement new forms of practice. While most research has focused on communities of practice composed of independent individuals, a community of practice may also serve as a way to foster learning across multiple teams (McDermott, 1999). If we conceptualize team formation as practices impacted through learning, it is possible a community of practice may help shape the processes of search and selection for team members.

Research Questions

The purpose of this study is to explore change team formation within academia with particular attention to the role of a community of practice on team formation processes. Previous research explores the formation of organizational and entrepreneurial teams. Here, we investigate how well the theoretical framework of the search and selection processes of team formation map onto academic change teams and how a community of practice may impact search and selection processes. Specifically, our research asks the following questions:

1. How do change teams within academia search for members?
2. By what criteria do change teams within academia select team members?
3. How, if at all, did a community of practice impact the change team formation processes?

Methods

Setting: Revolutionizing Engineering Departments (RED)

This analysis of team formation emerges from participatory action research with the U.S. National Science Foundation (NSF) Revolutionizing Engineering Departments (RED) grant recipient teams investigating the change process within STEM higher education. The NSF RED funding mechanism is designed to support awardees in creating systemic change, both to improve educational outcomes in the middle years of college and to create more inclusive educational environments. NSF requires that teams are multidisciplinary; that is, the funding requires the inclusion of instructional faculty, education researchers, social science or organizational change experts¹, and administrators.

As of 2023, NSF has awarded 26 RED grants to 24 institutions. The funded projects range in scope from one department to an entire college. The departments that have been represented in RED awards include: aerospace, biological, biomedical, chemical, civil, computer, electrical, environmental, and mechanical engineering, and computer science. All the funded RED projects were designed to create long-lasting changes to engineering education. Despite this shared goal, RED projects vary both in the content of the changes they are pursuing as well as their change-making strategies. For example, one team is pursuing a multi-pronged approach including changing admissions policies, developing a more inclusive curriculum for core courses, and enhancing faculty understandings of diversity and equity. Another team is working to design and implement courses that integrate traditional technical skills with curriculum around social justice, peace, and sustainability.

In addition to funding the RED teams, NSF has also funded RED Participatory Action Research (REDPAR), to support the work of RED teams and to conduct research with the RED teams on the change process across project sites. REDPAR investigates research questions related to systemic change projects while also providing customized faculty development curriculum through a community of practice. REDPAR hosts monthly virtual calls and an annual in-person meeting where team members gather together to hone their change-making skills. The RED community of practice serves as a space in which RED teams exchange knowledge to improve their capacity to make change within their institutions.

Data Collection

Focus group discussions are conducted with each team at two time points: within the first six months of their grant ('baseline') and approximately 28–30 months after their grant was awarded ('midpoint'). All RED teams were invited to participate in both a baseline and midpoint focus group discussion. For each focus group, all team members that had joined the RED community of practice listserv were invited to par-

¹ The NSF grant solicitations in 2014, 2015, and 2016 required the inclusion of a social science expert on each team. There was no solicitation in 2017, and in 2018 the solicitation requirement was modified and from then on has required an organizational change expert instead of a social science expert.

ticipate; the email invitations also requested that the teams share the invitation with any additional team members who might not have been included on the email (e.g., new team members, team members who had not joined the listserv, etc.). Separate focus groups were held for each team (i.e., each focus group consisted of members of only one team).

For this paper, data come from the focus group discussions at baseline and midpoint with the first three cohorts of RED teams, who received their grants in 2015, 2016, and 2017. Of the 19 RED teams in the first three cohorts, 18 completed a baseline focus group and 17 completed a midpoint focus group, with 16 of these teams completing both. The data in this paper are restricted to the 16 teams that completed focus groups at both time points, to allow for longitudinal analysis. Thus, the data in this paper are from a total of 32 focus group discussions (two per team with 16 teams). The focus groups ranged in size from two to nine individuals, with a median size of five. A total of 109 individual team members participated across all 32 focus groups, including thirteen PIs, fifteen social scientists, and eight education researchers.

The nature and purpose of the research was described to all teams at the first monthly community of practice call each academic year. Consent forms for the focus group discussions were distributed via email as the focus groups were scheduled; verbal consent was then collected at the beginning of each focus group discussion. Focus groups were recorded and transcribed; individual names were replaced with study codes within the transcripts to protect confidentiality. The data presented in this paper are identified by team member role (i.e., PI, Co-PI, social scientist, engineering educator, faculty member, postdoc, student) but not by school, to protect confidentiality.

Both the baseline and midpoint focus group discussions followed a semi-structured format. Baseline focus groups were designed to gather information on the initial stages of the change projects, including team formation, the proposal writing process, and relevant prior experiences. The midpoint focus groups centered on project implementation, impacts of institutional context, and the skills involved in academic change-making. Focus groups are particularly useful in this research as they reveal individual and collective reasoning, allowing the researchers to gain insight into relationships among team members (Morgan, 1996).

Data Analysis

We utilized a grounded theory approach, moving recursively between the data and theory-building while centering new or contradictory findings (Charmaz, 2006). Grounded theory methods are particularly appropriate for this study due to their usefulness in investigations of process (Charmaz, 2011; Hood, 2007). The tools of grounded theory allow researchers to assess processes within context, the conditions under which processes occur, the stages or phases of processes, and the outcomes of processes (Charmaz, 2011). We have attended to each of these aspects through our data analysis, as guided by our research questions.

Two team members read through all transcripts and first applied open codes to the data in NVivo software. Regular meetings to discuss codes as well as written memos were employed to ensure intercoder reliability. These initial open codes were

recalibrated through iterative comparisons to the theoretical literature around team formation throughout the coding process and reorganized through axial coding. The axial codes included: project formation, team building, confidence in team, team enlargement, team leadership structure, and sense of team identity. Throughout the coding process, analytic memos were written to identify patterns in the emergent codes and to investigate the implicit meanings and underlying assumptions within the data (Charmaz, 2006).

Findings

Our analysis demonstrates how change teams form and transform over time. The first section details the initial search process, before turning to the factors that informed the initial selection of team members. We then assess how the RED community of practice impacted team composition and how team members came to understand their individual roles. Next, we analyze how teams' understandings of their instrumental needs changed over time. Finally, we examine team member turnover as the teams evolve over time.

Search Process for Initial Team Members

Most teams described an initial centralized process of team formation in which one or two individuals led the process of assembling the team. For six of the teams, the PI led the team formation and proposal development process, while a Co-PI led this process for another six teams. The remaining four teams described a decentralized process of team formation that involved multiple team members in project initiation and team formation.

All but two of the teams described finding at least some of their team members through prior working relationships. Teams framed this search process mechanism as “comfortable” and finding people that were a “natural fit”. One Co-PI explained, “It felt pretty organic, from previous working relationships, and knowing what each others’ specialties and interests were, and that took off from there.” Prior working relationships among team members created a sense of confidence at the outset of their projects, with teams noting they were “lucky” as they were able to build a team that honored each person’s expertise and interest areas.

Most teams also described finding team members through their professional networks. In particular, teams often relied on networks to find individuals to fit the roles prescribed by the NSF solicitation of education researchers and social scientists, as well as finding project evaluators. While team members that had previously worked together were viewed as “obvious choices”, teams viewed the process of finding individuals through their networks as more laborious and less straightforward. For example, one PI explained:

It was very difficult to understand the role of the social scientist and the role of education researcher... So, we really did a broad beam. We each talked to several different departments, looked at ... the department websites and looked at

their expertise, tried to reach out to them. It was very difficult to pin down who was the right person for the social scientist role and the education researcher.

It was unclear from the focus group discussions if teams would have made efforts to find individuals through their networks without the NSF role requirements.

In total, nine of the sixteen teams described finding team members through both prior working relationships and professional networks. Five teams reported finding team members only through prior working relationships and two teams reported forming entirely through network connections. All five of the teams that formed through a decentralized process (i.e., with multiple people leading project initiation) were based on prior working relationships. In contrast, the two teams that were formed entirely through networks were both centralized, one led by a PI and one led by a co-PI.

Factors in the Decision-Making Process of Initial Team Member Selection

The RED teams valued social factors such as familiarity and affect in selecting team members. As most teams relied on selecting individuals they had worked with previously, it is unsurprising that they described these working relationships in a positive manner. As one PI explained, “Most of us have worked on creating this engineering school for over twenty years... We work well together, so I feel positive.” The familiarity provided by prior collaborations assured teams that they were choosing individuals that would be enjoyable to work with. One engineering education researcher discussed this explicitly, explaining, “For me, [in a past collaborative project], we learned the importance of team building. Not earth shattering, but working with people you like really matters in change work.”

In discussing instrumental factors for team member selection during the baseline focus groups, most teams struggled to articulate specific skills that they would need to successfully enact change. Rather than seeking team members with specific skills, many teams sought individuals with past change-making experiences under the assumption that these individuals would thereby possess the necessary skill sets. An education researcher explained:

If you think that you’re prepared for a major change agent process like this, you’re deluding yourself. I think you pull together the right thing, the right people, create strengths in areas where you need strengths, and then...you change your own structure, your own approach to things, as you go along.

As seen in this quote, RED teams stressed that change processes are unpredictable, and thus felt that flexibility and adaptability would be key to their success.

When teams did speak to their consideration of skill sets in the team member selection process, they primarily discussed interpersonal skills: collaboration and communication with external stakeholders. For example, one Co-PI explained:

I think one of our strengths and one of our real skills is sequencing and communication, and realizing that nothing that can be really a lasting change, is gonna

happen quickly. If we try to push too quickly, things could really go awry. This idea of rolling out and building on success is really gonna be a key of how we approach this. It's not an easily earned skill set.

As exemplified in this quote, teams spoke about communication skills in general terms and were focused on communications with external stakeholders.

The NSF solicitation requirements for RED grants mandated a certain amount of instrumental team member seeking, even if teams did not always understand at the outset what skill sets individuals in required roles would bring. That is, the RED funding mechanism requires at least one social scientist and one education researcher on each team; given differences in their training and experiences, the individuals in these roles came to their teams with specific instrumental skill sets. However, teams often reported confusion over role differentiation at the baseline focus group discussions. As one education researcher explained:

I think we're figuring out exactly what our roles are, of our evaluator, our social scientist, our education specialist. It's not bad or problematic, but we realize that it needs to be done. Because those lines aren't necessarily clear.

Similarly, an education researcher on a team formed entirely through network connections explained, "I think I felt prepared for the piece that I thought I was going to contribute, but as with any new start-up, there's been some arrangement and rearrangement of expectations and responsibilities." As with the teams quoted here, when RED teams used their professional networks to find their social scientist(s) and education researcher(s), they tended to exhibit less role clarity at the outset of their projects, in part due to limited prior experiences on interdisciplinary teams.

In contrast, some teams came together primarily through prior working relationships and thus had more clarity of how their skills mapped onto the NSF required roles. For example, the social scientist on one RED team had many years of experience in collaborating with the other team members; this team highlighted specific skills, such as facilitation, that the social scientist would bring. Similarly, a PI on another team that had prior collaborations with their social scientist was able to describe not only what type of data their social scientist would be collecting, but also how the social science research would be valuable to the change project overall.

At the outset of their projects, many teams assessed the NSF required roles of social scientist and education researcher as bringing value to their project through these individuals' location outside of their engineering or computer science department. Teams saw these individuals as separate from any departmental politics or past conflict. Teams were hopeful that the outsider status of the social scientists and education researchers would lend credibility to their change projects. Only a few teams noted the value of the analytic skill sets of the social scientists and education researchers as supportive of their change project.

While some teams viewed outsider status as a source of social capital, in the form of credibility, many of the teams also discussed social capital in terms of professional rank. For some teams, this meant working to ensure that at least some of the team members were in tenured positions. One team that was composed entirely of tenured

faculty reflected that their experience and rank gave their team a degree of credibility. This team's PI explained:

I've noticed that compared to other [RED] teams we have, well we have all highly experienced faculty on our team. [Our education researcher] comes into a meeting and she's able to engage everyone and move us all as a team. And if she were a postdoc or graduate student, would they listen and move in the same way? I'm not sure.

Other teams felt that to create systemic change, it was important for their team to include individuals at a variety of "levels", referring specifically to including both faculty and administrators. For example, one team explained that they intentionally included individuals who would do the "day to day stuff" as well as an individual in their Dean's office and an individual in their Provost's office.

At the outset of their projects most RED teams discussed the importance of including students and staff on their team primarily from the perspective of needing more human capital to get the work done. During the baseline focus groups, only two teams highlighted the social capital that students bring to projects. One team described the role of an undergraduate student team member as facilitating communication with and connection to departmental students. The second team explained the role of their graduate student team members as providing access to resources as well as conducting research related to their project.

Impacts of the RED Grant Mechanism and the RED Community of Practice

The initial search and selection processes of team formation occurred during the grant preparation process. As described above, factors impacting this process included prior working relationships, outreach through professional networks, and the NSF solicitation requirements to fulfill certain roles. In addition, some teams began connecting with funded RED teams during their proposal writing process, and these interactions helped shape their initial team formation. One education researcher explained:

Talking to [funded RED teams] was really important. I didn't really understand what we were trying to write. I would read proposals and still not get it. After having a team here, it was like "Ohhhh, this is the point"—it's different than the research I'm used to.

Connections with funded RED teams allowed developing teams to get a better sense of the change project they were designing; this allowed teams to better understand who they needed as team members in order to be successful. This same education researcher went on to explain that as these conversations helped shape their project, they better understood the need for a team member with organizational change expertise that would align with their project.

Some teams modified their team composition while undergoing multiple rounds of grant applications, often stating that they didn't have the right team at first. One PI explained, "NSF put in a very particular vision of what the team should be. Prior to

that, those connections weren't there—had to find people from social science, education.” This PI went on to explain that it was through repeat proposal submissions and reviewer feedback that they gained insight into the team composition needs.

Once teams were awarded RED grants, they became part of the larger community of practice of RED teams that interact through monthly conference calls and an annual RED meeting. These interactions shaped teams' understandings of their own instrumental needs as well as individuals' understandings of their role within their own team. In addition, comparisons with other RED teams would often lead to a greater appreciation for their own team members' strengths.

At the baseline focus group, only five of the 16 teams had a project manager on their team. However, some teams went on to hire project managers after learning through interactions with other teams of the instrumental needs that project managers fill. As one PI explained:

[Our project manager] was the newest thing that came out of the [RED Meeting]. We didn't have a budget for a project manager, because I didn't see that as part of the plan at the beginning, but it became pretty clear from meeting with the other RED teams that that was important. We changed our budget and we got one.

Other teams relied on departmental staff to fill the project management role. This was the case with one PI, who explained, “We have a very strong senior administrative assistant that is part of the team. And her ability to move the needle forward into organizing some of these events and help people feel included in the projects that we're doing and whatever.” This senior administrative assistant did not attend focus group discussions or any of the RED community of practice calls or meetings, suggesting limited team involvement. Many teams who praised staff during focus group discussions did not fully include staff as team members.

The annual RED meeting not only provides an opportunity for teams as a whole to interact, it also offers a space for individuals in similar team roles to connect. For individuals who are an “only” on their teams—the only social scientist, the only department chair—these connections can be especially supportive. One social scientist explained:

For me, what was useful about the RED meetings came from talking to [two social scientists] each from different project teams, but who had many of the same ideas I did for starting out. Having a bit of that confirmation, that I wasn't totally off in left field, that was helpful. But also, to have professional contact, somebody to work with, to bounce ideas off of, somebody with a like mind but unfamiliar with the details of what I'm doing.

Thus, these connections helped team members to validate both their own expertise as well as their experiences with their respective change projects. Developing an understanding of their role on their respective teams aided team members by reducing uncertainty in interdisciplinary collaborations.

Changing Understandings of Instrumental Needs over Time

Comparison of the focus group discussions that occurred at the baseline with those at the midpoint reveals how teams' understanding of their instrumental needs shifted over time. At the outset of their projects, teams primarily spoke of the importance of collaboration and communication with stakeholders. By the midpoint focus groups, teams discussed the value of interpersonal skills in much more specific terms, citing active listening, mutual respect, conflict management, empathy, and cross-disciplinary communication. In addition, by the midpoint of their projects, teams were better able to articulate the skills and value of the social scientists and education researchers on their respective teams.

At the midpoint focus groups, most teams expanded on the value of communication skills, this time centering communication among team members and active listening. For example, one Co-PI stated:

[Our PI's] leadership style is different. As an outsider to [this department], being involved in this project was the first time I saw her working as a leader within her department. Her style is very inclusive. She listens a lot.

As shown in this quote, active listening was also seen as a valuable leadership skill by team members. This was an expansion of how teams delineated the importance of communication skills for team members from time of the baseline focus groups to the midpoint focus groups.

Teams also discussed communication skills and leadership at the midpoint regarding management of interpersonal relationships among team members. For these teams, interpersonal management moved beyond active listening to monitoring team dynamics and actively facilitating difficult conversations when needed. One social scientist explained:

I will pull people aside and say 'Hey, you seemed really excited about that,' or 'Hey, you were really quiet today,' or 'I really value your leadership on this,' or 'It seems like you really have a lot of interest here but maybe how can we let you run with that. You seemed a little frustrated.' I think there's a lot of, sort of management of the group both individually and collectively, that there's just a lot of little nudging but that helps make people feel like they can move forward.

Similarly, one team stressed the importance of empathy in reducing conflict; this team's education researcher explained that on their team, "it never gets to conflict because there are things like a lot of perspective taking that's going on." This individual went on to explain that these communication skills extended to their interactions with departmental faculty and credited their social scientist with helping the team see how different people might react. Thus, while at the baseline teams primarily discussed communication skills in terms of connecting with stakeholders, by the midpoint these teams drew connections between outward- and inward-facing communication skills.

At the midpoint focus groups, teams also discussed cross-disciplinary communication and being able to engage in constructive conflict as key instrumental skills. RED teams saw strength in their diversity of skill sets and perspectives across the team members. At times, these differences led to productive conflict, as described by one Co-PI who stated that:

[To] be really innovative, you need to have people who have different ways of looking at things and different skills, but that inevitably brings conflict and significant challenges. To me, it's fascinating that our team is extremely diverse and that has led to many conflicts and challenges in communicating. We are humbled every day by the fact that we're supposedly trying to teach or provide a learning environment for our students to develop their skills, while, at the same time, we have a lot to learn ourselves.

Similarly, a PI on a different team reflected that, "We have immense respect for each other. Even if we disagree, we disagree respectfully." Thus, connecting across disciplines requires a foundation of mutual respect to be able to engage in constructive conflict; this mutual respect developed as members came to understand the broad range of skill sets needed in their team.

While some teams were initially unsure about filling roles with experts outside of their discipline (e.g., social scientists and education researchers), these experts were often explicitly recognized in midpoint focus groups. For example, one team member described their social scientist as the team's "nucleus" who "really drives the whole thing." On another team, an education researcher explained:

[The social scientist on our team] has been a real blessing to me and I think the project. He's been willing to work with us to contribute his expertise and insight and skills, even though it's not going to be necessarily one of the most productive professional experiences for him in terms of the traditional metrics.

In this case, not only is the expertise of the social scientist recognized—this speaker is also recognizing and valuing the social scientist's values as they chose to prioritize the team's collective goals.

As described above, the vast majority of teams stressed communication as an important instrumental skill for their team. Many teams also credited their social scientist and, in some cases, their education researcher with helping teams improve both their internal and external communication skills. In terms of internal communication, for example, one PI explained that "We agreed to have more meetings, because as [our Social Scientist] pointed out, we don't communicate often enough. It's just not our strength." Here the social scientist suggested a structural change related to communication (i.e., increased frequency) to improve team functioning. Other teams focused on the value of their social scientist regarding external communications, such as helping them frame messaging to stakeholders and even recommending specific words to use to help connect with individuals outside of their core team.

As discussed at the baseline, some teams also saw the value of their social scientists, education researchers, and evaluators as team members who were external to their

department or college. For example, one PI explained at the midpoint focus group that their social scientist “had no vested interest in the department” and so because of their involvement, “some people softened a little bit in their attitude toward the need for change.” As expressed in this quote, the outsider status of the social scientists, education researchers, and evaluators brought a degree of credibility to the change projects, which was in line with expectations expressed during the baseline focus group. Similarly, one PI credited the value of their evaluator, explaining:

[Our Evaluator] has taken a really big leadership role, and stepped up... with the problem solving, and keeping everyone moving, and documenting, and we’re getting ready to do a revision on what we established over the summer. And so, she’s taking that role and bringing the faculty together, to take the chair out of it. Because I think it’s really important, you don’t want it to be top-down.

For this team, their evaluator not only came from a position outside of their department, but also from outside of a leadership role at their institution. Thus, their team was able to cultivate credibility for their project by expanding beyond a top-down model of change.

In contrast, many teams valued the social capital brought by team members who held leadership positions at their institutions. NSF required that the PI on each RED team be either a chair or dean; at the midpoint focus group, many teams credited their PI with being able to catalyze changes due to their positional power. One education researcher explained, “it would be my speculation that the ones that really are able to make some transformations are the ones that have leadership that has been involved, and not just bystanders, but actively buying into whatever the goal of the RED project is.” A few teams experienced increases in social capital as team members, typically PIs, moved into higher ranked positions at their institution. For example, one PI advanced from a leadership position into an upper administrative role; this PI credited their promotion as allowing their project to attain “institution-wide visibility and support.”

These types of shifts also created new challenges—this same PI also stated that due to their change in position, they “struggled with less opportunities to have face-to-face time with the faculty.” A Co-PI on this team further elaborated:

The way the transition happened, with [our PI]’s role change, it has helped us expand beyond [our department]. We had to be adaptable to make these transitions in leadership. As we try to support other departments [at our institution], getting them on board and making some of these changes college-wide, we have to be adaptable because every department has a different context. Our transitions have been a learning experience in having to be adaptable.

Teams had anticipated, at the baseline focus groups, that adaptability would be a critical skill for them and, as seen in this quote, they reflected at the midpoint focus groups that this skill was a key to the success of their change projects.

Team Turnover and Leadership Structure

The departure of team members, or turnover, is critical to team formation. In analyzing the turnover experienced by the RED teams, a correlation with team leadership structure was found. Team leadership structure was assessed through: (1) how teams discussed the delineation of responsibilities, (2) how teams gave credit to individual team members for successes they achieved, and (3) communication patterns at the focus group discussions. Seven of the teams were categorized as having a relatively centralized leadership structure in which one individual was identified as holding most of the responsibility, was credited with leading the team, and took on the role of leading the focus group discussion, often calling on other team members to participate. In contrast, the remaining nine teams were categorized as having a relatively dispersed leadership style in which different team members were identified as leading different aspects of their project, many individuals were praised for their leadership skills, and the majority of team members equitably shared airtime during the focus group discussions. There was no correlation between the centralization of the initial team formation and proposal development process (as described in the “Search Process for Initial Team Members”) and the leadership structure at the midpoint focus group.

Four RED teams experienced significantly higher levels of turnover in team membership relative to the other teams. All four of these teams had a centralized leadership structure. Turnover on two of the four teams was driven by factors exogenous to the change project—for both of these teams, multiple individuals moved into professional positions at different institutions. The leadership structure on both teams became increasingly centralized as a response to team member turnover. That is, as these two teams experienced fluctuations in team membership, responsibilities in terms of both meeting project goals as well as managing group dynamics fell increasingly on one respective team member who provided longitudinal stability for the project. The social scientist on one of these teams explained the turnover process:

We had new faculty, new leadership, and that really forced us to sit back and think about what really did we want to do now that all the players had changed, and so we spent really a whole year just trying to redefine what we’re doing.

As exemplified in this quote, both teams that experienced turnover due to exogenous factors took the time to engage in building shared vision for their project as new team members joined their respective projects.

In contrast, two teams with high turnover had a centralized leadership structure even at the baseline focus group. Not only did these teams both have a centralized leadership structure, but the leaders of each respective team had a strong vision for their change project. During the midpoint focus group discussions, these leaders explained that the team members who had exited their respective teams had come to the project with differing sets of expectations for the project. For example, one Co-PI stated that, “I had a vision...that hasn’t changed very much, if at all, but to this day I still feel like not everyone gets it or everyone has different ways.” For both of these teams, it appears that the leader’s strong vision for their respective projects precluded

building a unified voice for change among all team members; unified voice (i.e., a shared sense of commitment, purpose, and direction) must be developed through internal team communication and consensus building over the vision for the team (Blee, 2012; Dugan & Reger, 2006; Margherio et al., 2021). When the team leader's sense of vision for their team precluded building a shared cohesive understanding of their team's purpose, this lack of unified voice in turn drove team member turnover.

Discussion

In this paper, we examined team formation processes for individuals leading change projects within higher education through the theoretical concepts of search and selection. We found that the search process of change teams was informed by prior working relationships, professional networks, and the NSF solicitation requirements to fulfill certain roles. While familiarity and affect shaped the selection of team members, teams had difficulty articulating the specific skills needed at the outset of their change projects. The grant funding requirements informed team formation by mandating one social scientist or organizational change expert and one education researcher on each team, leading to interdisciplinary teams. We found that the RED community of practice influenced team formation practices by shaping how teams understood their instrumental needs and how members understood their role.

Much of the prior research on team formation has focused on teams in industry or entrepreneurial teams where there is an explicit or implicit expectation that individuals know which skills will be needed to accomplish the task at hand. Our research on change team formation within academia indicates an important contextual difference: teams reported a lack of clarity at the outset on what skills would be needed. Our findings on how teams handled the search process offer an explanation for this difference. Teams that came together through prior working relationships had more clarity of how their skills mapped onto the required roles, while teams that relied on professional networks for the search process lacked this clarity, suggesting that prior experience in interdisciplinary teams matter for subsequent academic team formations.

Given the difficulty teams had at the outset in articulating the specific skills needed for their projects, many teams selected members who had past change-making experience. Teams recognized that change processes are unpredictable and anticipated that flexibility and adaptability would be key for success. These selection criteria were validated during the midpoint focus groups, when participants reflected on the unforeseen changes experienced within teams during the implementation of their projects.

The NSF funding requirements also created important contextual factors to team formation by requiring specific types of expertise and social capital be included in the team, in the form of a social science or organizational change expert, an education researcher, and an administrator. This requirement helped assure that teams were formed with complementary skill sets, even if the teams were initially unclear on what specific skills were needed for their projects. At the outset, teams often struggled to articulate the different roles that these individuals would fill on their team, yet

at the midpoint of their projects they spent a fair amount of time praising the value of their social scientists and education researchers.

Prior research suggested that the formal requirements of funding programs might influence the *selection* of team members, if the grant mechanism required certain roles or specific areas of professional expertise; it did not expect those requirements to influence the *search* for potential members, where social criteria were expected to dominate (Scheidgen, 2019). In contrast, we find that the RED funding requirements impacted both the search and selection processes. The requirements that NSF put forward meant that teams sought social scientists and education researchers who were external to their department or college. Thus, rather than relying on pre-existing social ties or outreach through their scientific networks (Scheidgen, 2019), many RED teams found their social scientists and education researchers via broad searches of departmental websites and outreach to department chairs. Although they expressed uncertainty at the outset about their team's instrumental needs and what these individuals would bring to the team, the funding requirements helped build a broad array of skill sets on each team.

The RED community of practice influenced how teams viewed the responsibilities and contributions of individual members. Being part of a community of practice allowed the teams to better understand different roles and skills, and to quickly identify gaps in their own teams through comparison. For example, many teams first realized the need for a project manager after talking to other RED teams who were further along in their projects. For team members who did not share the same role as anyone else on their team, the RED community of practice facilitated connections with other individuals who filled that role; this provided them with professional network ties they could turn to for advice. Contributing to prior literature that highlights communities of practice as places for learning, this research shows that the exchange of information and regular interactions within a community of practice also benefit members' team formation processes.

Our longitudinal analysis sheds light on additional aspects of how academic change teams transform. How teams understood their instrumental needs developed over time, moving from vague language at the baseline to describing the necessary skills in more specific terms at the midpoint. Further, our findings revealed factors related to team turnover, finding a correlation between team leadership structure and turnover within teams. Centralized teams experienced significantly higher turnover in membership compared to teams which had a dispersed leadership style. While some of this correlation is explained by factors exogenous to the team, the analysis suggests the importance of incorporating team members' values and goals into the team's project to reduce team turnover.

Limitations

While this research adds insights to how a community of practice impacts the search and selection processes of team formation, it also points to areas for further research to address some of the limitations of this work. First, our data are limited to teams that have received NSF RED grants. While we found that the funding requirements directly impacted both the search and selection processes, future research on teams

formed through other funding mechanisms is needed to improve our understanding of the role of funding requirements in different contexts. Second, while our data analysis suggests a relationship between team leadership structure, unified vision, and team member turnover, our dataset only allows for limited analysis of this potential relationship. Further research is needed to establish and deepen our understanding of how team leadership structure may impact the ability of a team to develop unified vision as well as how the development of unified vision impacts turnover. Third, it may be generative to connect the research on academic change team formation with prior research on interdisciplinary collaborations to further our understanding of communication and leadership within interdisciplinary change teams. Finally, while our data allowed for longitudinal analysis, this analysis still represented the early stages of the change projects (i.e., the first three years) and does not allow for a thorough investigation of the role team formation processes may play in the ability of teams to effectively enact change nor does it allow for research on how truly “revolutionary” the outcomes of these projects may be. Future research is needed to improve our understanding of how the search and selection processes as well as communities of practice may impact change making within higher education.

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Author Contributions C.M. designed the study, designed the data collection instruments, obtained IRB approval, and collected the data. A.S. performed the data cleaning and initial coding of the data. S.G. led the later stages of data coding. All three authors reviewed the literature, developed the theoretical framework, discussed the results, contributed to writing the manuscript, and approved the final manuscript.

Data Availability Dependent on IRB guidelines, the data analyzed in this study may be available upon reasonable request.

Declarations

Ethics Approval The University of Washington Human Subjects Division (HSD) determined that this research (#52331) qualifies for exempt status in accordance with the federal regulations under 45 CFR 46.101/21 CFR 56.104, exempt category determination 2. This study was performed in accordance with the ethical standards as laid down by the University of Washington Institutional Review Board and the Office of Human Research Protections within the U.S. Department of Health and Human Services.

Consent to Participate This research adhered to ethical guidelines and obtained informed consent from all participants prior to their involvement.

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