

# Interdisciplinary Training For Future Leaders Through The Create-Redevelop Graduate Student Program

Madeline Springle\*, McKenna Sperry, Samantha Jones, Leah Pezer, Thomas  
O'Neill, & David W. Eaton

University of Calgary

*REDEVELOP is a graduate student training program funded by the NSERC-CREATE grant, starting in 2017. Its goal is to support the training of new professionals and researchers (> 100) who will be the next generation of science and engineering leaders and policymakers in Canada. The program has successfully developed a framework for operating almost completely virtually, well ahead of the world's transition to online learning due to the COVID-19 pandemic. Our psychology lab, The Individual and Team Performance (ITP) lab, has dedicated over a decade to researching and designing tools that enhance specific training and skill growth necessary for effective remote teamwork. In partnership with the REDEVELOP program, we support students in navigating the unique interpersonal and collaboration challenges posed by virtual team environments. We will discuss how a complex and multidisciplinary program succeeds in training graduate students to become stronger academics, practitioners, and communicators of knowledge.*

The REDEVELOP program is a comprehensive, nationwide postgraduate educational program in Canada. Beginning in 2017, it was funded by an NSERC-CREATE grant awarded to the University of Calgary and four other Canadian universities. The program's fundamental goal is to strengthen the development of promising scholars, facilitating their growth as future change-makers in science, engineering, and public policy. The founding researchers are dispersed over five universities across Canada (Calgary, Alberta, Toronto, Waterloo, and Western Ontario), collaborating to make this program a reality. It has since evolved to include professors, industry innovators, government entities, and Indigenous-led organizations. The program assembles interdisciplinary teams of graduate students nationwide in a mainly virtual format. Within their teams, graduate students work together to address global energy-sector challenges and explore low-carbon alternatives (REDEVELOP, 2023).

\*Corresponding author – [madeline.springle@ucalgary.ca](mailto:madeline.springle@ucalgary.ca)

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The primary objective of the REDEVELOP program is to develop highly qualified professionals possessing robust communication, interpersonal, and leadership competencies. Such skillsets are often not honed within traditional academic programs in science and engineering, yet they are vital to the success of these future innovators and leaders for careers in both industry and academia (Ohland et al., 2012). Deficiencies in these skills have specifically resulted in a gap whereby academics transitioning to industry settings struggle to effectively exhibit these interpersonal skills (e.g., communication, conflict management, and leadership) to foster collaboration and innovation (Teng et al., 2019). Consequently, by fostering the growth of these critical skills, the program effectively positions its graduate students for success upon finishing their educational degrees. Lastly, in response to the growing trend of hybrid and remote work environments accelerated by the COVID-19 pandemic, the program plays a crucial role in developing team skills that are increasingly in demand (Newman et al., 2021).

REDEVELOP's interdisciplinary training approach requires an understanding of the difficulties inherent in navigating various team environments (O'Neill & Salas, 2018). The Individual and Team Performance (ITP) laboratory at the University of Calgary is committed to investigating factors influencing effective teamwork, particularly for hybrid and remote teams. Since its inception, the lab's partnership with REDEVELOP has involved supporting students with teamwork dynamics and various interpersonal aspects integral to the program.

### **REDEVELOP Deliverables**

REDEVELOP annual cohorts typically include 15 to 20 students, organized into four to five teams. Each team is assigned to explore a low-carbon resource or emerging technology (e.g., measuring fugitive methane emissions, hydrogen production and storage, carbon capture, utilization and sequestration). The REDEVELOP program requires several deliverables that each team must produce: a scientific poster tailored for a technical audience, a policy paper, a concise 90-second video intended for a general audience, and a comprehensive 15-minute presentation for a panel of industry and academic judges, along with various audience members from the community. Teams are expected to integrate their scientific research question, which is focused on a specific energy sector such as carbon energy, hydrogen, critical minerals, etc., incorporate Indigenous perspectives, and encompass a public policy component. Incorporating Indigenous perspectives involves integrating the knowledge, beliefs, practices, and viewpoints of Indigenous communities into the research process while collaborating with Indigenous mentors and community stakeholders. Finally, encompassing a component of public policy involves each team considering how their findings can inform or influence public policy, such as developing recommendations for sustainable resource management, environmental protection, or community engagement strategies informed by scientific findings and Indigenous knowledge.

Throughout the duration of the program, students receive a diverse set of training via workshops, webinars, and team-oriented coaching sessions. This comprehensive approach is designed to equip students with the skills and knowledge required to effectively participate in an interdisciplinary team of professionals. As part of the CREATE grant, REDEVELOP provides

financial assistance to each student, ranging from \$6,000 to \$12,000 CAD dollars, to support the successful completion of the program. In addition to the enriching experience and valuable skillsets acquired, the program offers an additional incentive: each member of the winning team is granted a monetary award of \$1,000 CAD dollars to attend an academic conference, providing further opportunities for learning and networking within the academic community.

## **Working Across Disciplines, Distances, and Cultures**

The REDEVELOP program is intentionally designed to bring together students from various disciplines, cultural backgrounds, and geographical locations to collaborate on an energy sector challenge (REDEVELOP, 2023). Participants in the program are graduate students in the process of completing their Master's or Doctoral degrees at a Canadian university. Numerous international students from diverse cultural and ethnic backgrounds provide the program and teams with unique perspectives and life experiences. Diversity among cohort members is both a valuable asset and a potential challenge for the program. Specifically, while there is a greater risk of disruptive conflict, the innovation potential within diverse teams is significantly greater (Cronin & Weingart, 2007). Indeed, working across cultures in a team environment can present difficulties, particularly when interaction is mediated through virtual platforms (Gibson & Grushina, 2021).

Remote and hybrid teamwork has become increasingly common across academic and professional landscapes due to the COVID-19 pandemic (Gilson et al., 2021). Remote teamwork necessitates specialized training and skill development to manage the unique interpersonal and collaboration challenges it presents (Henke et al., 2022). With their extensive experience in leading such training, the ITP lab provides crucial support in preparing participants to effectively navigate and succeed in a virtual team environment.

## **Using Assessments and Interventions to Work Towards Team Effectiveness**

Throughout the duration of the program, students complete various ITP assessments and interventions to enhance individual and team performance. As industrial-organizational psychology coaches for REDEVELOP, we distribute and analyze teamwork assessments to facilitate collaborative discussions to spark insight and provide opportunities for reflection. The following sections describe these assessments and activities in more detail.

### **ITP Lab's Suite of Assessments**

The tools and assessments developed by the ITP lab draw from over a decade of rigorous research. These evidence-based resources assist in providing diagnostic feedback on various teamwork components. Furthermore, they are correlated with team performance outcomes (O'Neill et al., 2018). The website that houses these free tools, [itpmetrics.com](http://itpmetrics.com), is used internationally by various institutions and organizations to assess, monitor, and report on many individual and team metrics.

During each year of the REDEVELOP program, students reflect on their teamwork experiences through *Team CARE* (described below) and *Peer Feedback* assessments. They complete these assessments in the winter and again in the spring to track development and progress throughout the REDEVELOP. We share the aggregate, group-level data with teams to identify opportunities for growth, celebrate successes, and encourage self-reflection through scheduled coaching conversations. Teamwork data provides tangible information for teams and coaches to identify focus areas and develop a plan to make actionable steps toward them (Jones et al., 2016).

### **Setting the Tone through Team Charters**

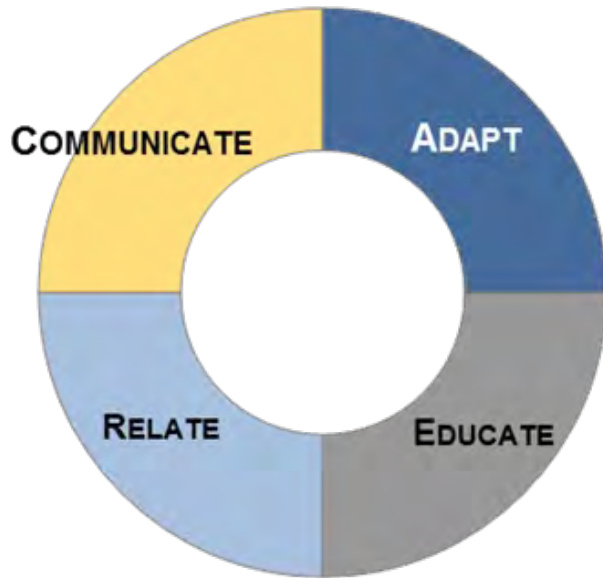
A Team Charter is a 'living document' to help manage team processes and preserve relationships. This is accomplished by outlining and formalizing team expectations and norms. The process of creating and formalizing a Team Charter can help teams avoid wasted time and resources and improve process outcomes such as team communication, effort, cohesion, and member satisfaction (Mathieu & Rapp, 2009). Addressing these areas of team functioning early on can help teams perform better as they move closer toward their goals. Through online meeting tools, students brainstorm and decide on team norms and practices with respect to a) expectations, b) communication, c) meetings, d) conflict & decisions, e) stress management, and f) breaches & penalties. Following the creation of the Team Charter, team members review the document and sign it to demonstrate their commitment to its tenants. Teams are encouraged to reference the established norms recorded in their Team Charter throughout the course of REDEVELOP, particularly when interpersonal challenges arise.

### **Team Health**

Team health is assessed using the Team CARE model, which provides detailed feedback on how well teams function in four key areas: Communication, Adaptability, Relationships, and Education (Figure 1; ITP Metrics, 2017). Students answer a series of questions about how their team functions that are related to these key areas. These questions are drawn from previously published scales that were chosen for their psychometric properties and, when integrated, demonstrated strong internal reliability and validity (O'Neill et al., 2018).

**Figure 1**

*The Four Features of the Team CARE Model*



*Note.* Figure is sourced from ITP Metrics (2017).

Individual feedback is aggregated to produce team-level quantifiable results (Table 1). The intention behind utilizing this assessment and providing teams with outcomes is to pinpoint areas for growth to enhance team performance and draw attention to team weaknesses and strengths.

**Table 1**

*Scoring Thresholds for the Team CARE Model*

<b>Score</b>	<b>Team Health</b>	<b>Implications</b>	<b>Suggested Action Items</b>
<b>3.0</b>	Cause for concern	There are likely significant interpersonal struggles and/or misunderstandings of roles, responsibilities, or team purpose.	Recommend individual interviews prior to bringing the team together to discuss team health. Experts should meet with team leader to help equip him/her to intervene and address issue. Are human resource management variables (i.e., team design, structure, leadership, economic issues, or politics) a factor?

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3.6	Moderate	Variability in member views and sub-dimensions within a bucket may exist, thereby impeding team functionality.	Assess and discuss areas that could be improved.  Create measurable goals on behaviour improvements. Identify support needed to achieve goals and a timeline. Pursue commitment to the goals with few options to decline.
4.0	Strong	Team members may not be aware of the root cause of their effectiveness, thereby impeding them from leveraging these strengths in future.	Assess and discuss member functioning within the team. Capitalize on strengths and create measurable goals for improving behaviours. Identify support needed to achieve goals.
4.5	Outstanding	Keep doing what you're doing!	Continue to focus on all of the elements of energized teams, paying particular attention to CARE elements, what is working, and how to maintain it.

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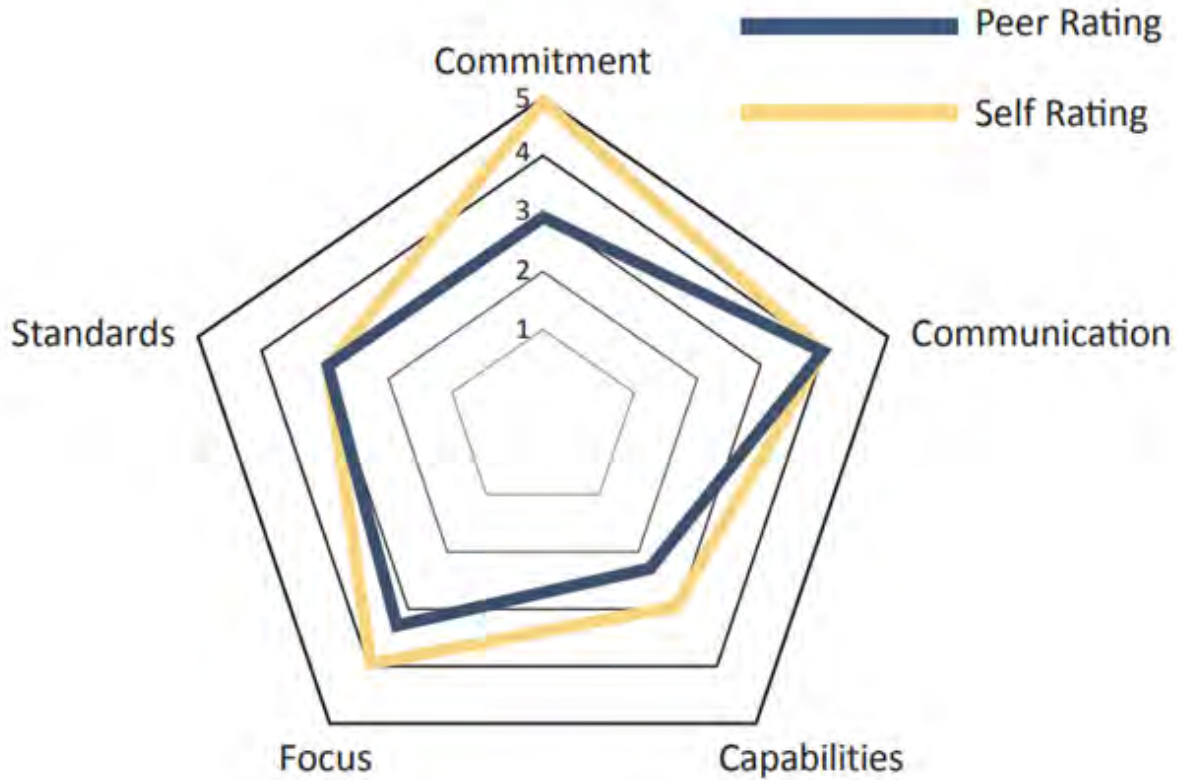
*Note.* Table is sourced from ITP Metrics (2020).

### Peer Feedback

The purpose of the Peer Feedback Assessment is to help students gain insight into the following teamwork competencies: (1) commitment to the team's work; (2) communicating with team members; (3) having a strong foundation of KSAs (*Knowledge, Skills and Abilities*); (4) emphasizing high standards; and (5) keeping the team on track (ITP Metrics, 2020). The assessment demonstrates satisfactory reliability and validity (O'Neill et al., 2019). Students provided anonymous feedback for each team member on the five competency areas. They were also asked to complete a self-evaluation to be used as a comparison. Students were given a five-point plot to visually demonstrate their individual ratings compared to mean ratings from their teammates (Figure 2). The intention behind providing this information to students is to help them identify areas of individual strength and growth, in addition to helping them develop awareness of their contributions to the project.

**Figure 2**

*Sample Peer Feedback Results*



*Note.* The corners of the pentagon represent the five teamwork competencies. Lower scores are points that fall closer to the center of the graph, and higher scores are points that extend toward the edge of the graph. "Blind spots" are points where there is a significant difference between the navy line and the yellow line (your self-rating is significantly higher or lower than peer ratings for a particular competency). Figure is sourced from ITP Metrics (2020).

### **Data-Informed Coaching**

Teams and team leaders (referred to as Project Managers) engaged in two coaching sessions throughout the course of REDEVELOP. In these sessions, we implemented the GROW model of facilitation (Figure 3; Leach, 2020). This model included four steps: 1. Identify team goals (Goal); 2. Determine if goals are being met adequately (Current Reality); 3. For unmet goals, discover what is happening and what options are available moving forward (Options); and 4. Determine what action steps can be taken (Way Forward). Visuals depicting team-level information were discussed during coaching sessions and emailed afterwards for teams' reference.

Team-level data collected through the ITP lab assessments and tools provides us, as industrial-organizational psychology coaches, with the information necessary to tailor our strategies and questions to each team's specific need areas. Collecting this data provides a foundation for productive coaching conversations by promoting a culture of transparency, accountability, and collective progress.

### Figure 3

*The Four Features of the GROW Model of Coaching*



*Note.* The GROW Model is a method of coaching that focuses on setting and moving towards a goal via four steps: 1. Identify Team Goals (Goal); 2. Determine if goals are being met adequately (Current Reality); 3. For unmet goals, discover what is happening and what options are available moving forward (Options); and 4. Determine what action steps can be taken (Way Forward). Figure is sourced from Leach (2020).

## Conclusion

The REDEVELOP program offers key takeaways on supporting graduate students to become effective team members and highly qualified professionals through its focus on the transformative impact of online learning and multidisciplinary teaming. Since each student team has members from different universities across Canada, the REDEVELOP program integrated virtual teamwork principles and research-based evidence long before the global COVID-19 pandemic forced many universities to transition to a remote format. This program plays a vital role in developing interpersonal and team skills, which is increasingly in demand for academics transitioning to industry settings (Newman et al., 2021). This structure has positioned the program as a leader in online education, demonstrating effective tools instructors and educators can utilize to respond to the challenges and opportunities presented by geographically dispersed, diverse student teams. Such challenges are inevitable when faced with virtual teams' competing demands and unique pressures (Gibson et al., 2021). Observations and data from previous REDEVELOP cohorts point to the importance of fostering open communication, transparency of expectations, and addressing interpersonal challenges head-on as they arise. This program aims



to bridge the scientist-practitioner gap by allowing academics to develop skills vital for success in industry (Teng et al., 2019).

As ITP coaches, we have seen significant improvements in team collaboration and productivity due to implementing the tools and assessments detailed in this paper. It is deeply gratifying to observe how teams, despite the diversity of backgrounds and perspectives, developed strong bonds with their team members through a primarily remote work relationship. It has been a privilege to have had the opportunity to support teams and witness team connection, collaboration, and innovation unfold over time.

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