

Project Leadership Program Resources for Teaching Leadership Skills

The Project Leadership Program is a pedagogical strategy developed with the long-term goal of increasing the diversity of future STEM leaders. To define leadership, we use Peter Northouse's definition that **leadership is the process of influencing others to achieve a common goal**. Leadership skills refer to skills involved in the process, including listening, interpersonal communication skills, and being proactive. The Project Leadership Program helps students develop leadership skills through three components: a web-based App called **Project Leadership**, active engagement of student teams, and supportive coaching from instructors. In this resource, we describe each of these components and provide examples of implementing the Project Leadership Program in different courses.

The Project Leadership App

The Project Leadership App is predicted to enhance Diversity, Equity, Inclusion, and Justice (DEIJ) practices in future STEM leadership by helping students develop a leadership identity, providing opportunities for students to develop leadership skills, and increasing a sense of belonging. In the App, students are able to view diverse leadership roles, select and change their roles, and learn about different leadership skills. After selecting a team role and skill to focus on for a time period defined by the instructor (e.g. one week or one class period), team members provide peer feedback to each other. Resources to learn about the App include this video demonstrating how students are introduced to using the App in a molecular biology CURE course and a faculty guidebook that is available in this QUBES resource file contents. In addition to using roles and skills provided within the App, instructors can create custom roles and skills. Instructors can sign up to use the App in their class for free at projectleadership.app.

Although students can learn leadership skills without an app, the Project Leadership App was developed so that students have a quick, tangible way to access evidence of their leadership strengths and areas for improvement across multiple courses. The goal is that students can recognize that just as the App is mobile, so are leadership skills. In other words, the skills are transferable and can be applied in other courses as well as their careers.

Engaging Students in Course Projects and Roles

Because leadership skills involve the process of influencing others towards a common goal, the incorporation of Project Leadership demands that students are working in teams towards a common goal. Ideally, the team projects are complex enough so that a single individual cannot

perform the tasks associated with the project on their own. Instead, the project requires collaboration between individuals who take on interdependent roles. Examples of several team role examples are shown in the role library included in this QUBES resource file contents. The role library also provides a template to use when writing descriptions of additional roles specific to your course goals. When thinking about establishing new roles for a class, it's important to think about how the roles are interdependent so that each role is needed and valued by the team.

Coaching Students to Provide Effective Feedback

Effective leadership occurs with frequent feedback to make sure that goals are being met within a specified time frame. Feedback helps teams to identify changes that can be made, when the changes will be made, and how each person can make sure that the changes are implemented. With feedback, teams can identify and resolve current or potential conflicts. Teams will also be able to use strategies that capitalize on each person's strengths.

To help students provide constructive feedback to one another, it's important to coach students on strategies for providing feedback. For example, feedback is helpful when both strengths and weaknesses are described in constructive manners. Constructive feedback promotes success by providing thoughtful comments and suggestions for improvement. It also identifies what can be changed and provides a means to make a change. Constructive feedback should be about the work being completed, not about individuals. To build instructor confidence in providing tools for students to provide constructive feedback, we've put together a list of feedback resources which is available as a file content in this QUBES resource.

Ways to Adapt the Project Leadership Program in Different Classes

Guided Inquiry Case Studies - Sheela Vemu

Collaborative learning through group work fosters a dynamic environment where students actively engage with course material and their peers (Johnson & Smith 2006). The potential for more substantial academic achievement in this setting is multifaceted. In a guided inquiry teaching format (2-year institution physiology course), I had specific roles assigned to students in a five-student group case study. The interactive activity encouraged students to clarify their misconceptions and reinforce comprehension of difficult topics while fostering a sense of community. This is particularly important because many students in a two-year institution are non-traditional compared to a four-year institution. Unlike the traditional pathway from high school to college, many of these individuals in my class are from any of the following categories: returning to education after a hiatus, working adults, parents balancing familial responsibilities, and students pursuing education alongside other essential commitments. Using leadership roles helped many students build a sense of community. The shared responsibility for knowledge. accountability, and support allowed them to navigate the experiences of a college classroom. The completion rates of the guided inquiry activities were much higher than before the implementation of the leadership roles. The students professed the social aspect of collaborative learning to help alleviate the fear of pursuing science courses.

I used the roles from the Leadership App for the guided inquiry case study format. The discussion Facilitator takes charge of moderating group discussions, ensuring everyone has a voice and ideas are explored comprehensively. I offered students ways to steer the group to provide perspectives without one person dominating the conversation. The Strategist focuses on planning and organizing the group's approach to the project, identifying key objectives and milestones. I offered students a plan for managing the case study based on the due dates for the initial submission for feedback from the instructor vs the final submission for grades. The Notetaker is responsible for documenting discussions and critical findings, creating a valuable resource for future reference. I offered students some tips on keeping meeting notes with bullet points. Contributors actively participate in generating ideas and contributing to the project's development. I showed students a clear distinction between a facilitator and a contributor. A contributor is helping with looking up a particular concept or molecule while the facilitator is aware of the group dynamics. The Summarizer synthesizes information, distilling critical points for clarity and understanding. I asked students to use bullet points for their summaries to avoid getting carried away with writing a narrative. The Quantitative Analyzer utilizes analytical skills to interpret data and contribute a quantitative perspective to the project. I emphasized that students should select the Quant analyzer role carefully because all guided inquiry activities had a graph, histogram, or arithmetic piece to delve into. By strategically assigning these roles, I found that students benefited from a structured and supportive environment, which enabled them to leverage each other's strengths and overcome challenges, ultimately leading to more successful collaborative learning experiences.

Multi-Week Projects and Rotating Roles - Mary Mulcahy

Adding group work to an activity has advantages and disadvantages. Reviewing these <u>four questions from lowa State University Center for Excellence in Learning and Teaching</u> may help instructors identify which projects or assignments would benefit from group work: "Will that objective be furthered by asking students to work in groups?", "Is the activity challenging or complex enough that it requires group work?", "Will the activity require true collaboration", and "Are there enough students in each group to fulfill all needed roles?" and "Are you able to dedicate class time or student office hours to reinforcing students' communication, coordination, and conflict resolution skills?" Once an instructor has identified suitable projects and assignments using the above questions, the app is particularly useful in addressing the final question, ""Are you able to dedicate class time or student office hours to reinforcing students' communication, coordination, and conflict resolution skills?" by providing a platform for the instructor to monitor and structure students groups and their interactions.

In a 15 week semester, I anticipate using four assignments that each take two weeks and that allow students to collect data from class projects and/or <u>SimBio simulation modules</u> that allow groups to design their own simulated experiments. By rotating roles among group members and having 4 members per group, I hope to allow each student a chance to experience different roles. The app will create a structure for me to monitor roles, skills, and feedback without being present at every small group discussion.

Artificial Intelligence Science Courses - Pankaj Mehrotra

Using Project Leadership App in AI courses and integrating Chat GPT may help in execution of projects at a better pace and also in developing leadership roles to use for specific tasks.

When working on a project, team members can ask chat GPT how to execute parts of their projects, what roles would be beneficial to have on their team, and how to execute their project. Incorporating Chat GPT may help students identify student-driven roles for completing diverse projects with the use of Project Leadership. The Project Leadership App can enhance not only learning of science content and concepts by taking leadership roles but also in better management of the time to learn science.

Teams of Interdisciplinary Scholars Challenged to Learn New Skills - Carlos Goller

Students introduce themselves to each other on a forum in a first and second-year course with no prerequisites. In the first week of class, the group contributes to the <u>community goals</u>. Instructors refer to students as Scholars through announcements and introduce a "Team Design Challenge" based on using microbial genomics to address electronic waste recycling. Participants share ideas by creating flow charts using Miro.com on boards that can be seen by all course members. This results in gaining an increased understanding of the research project, engaging in thought-provoking discussions and learning research techniques from one another. We create teams that bring students from different disciplines together to share their knowledge. Team reflections and accountability reports are submitted by different members of the group throughout the semester.

Sophomore or Junior CURE Course for Molecular Biology Majors - Laurel Lorenz *Describing the Benefits of Teamwork*

On the first day of class, students are introduced to how teamwork will be employed throughout the semester. Some benefits discussed include solving problems by crowd-sourcing ideas, collecting and analyzing more data, learning skills from one another, gaining an increased understanding of the research project, engaging in thought-provoking discussions, and learning research techniques from one another. Students learn that the most effective teams consist of members who bring diverse experiences and skills. With that in mind, we create teams based on a set of five self-identified skills that each person identifies as their strength.

Building Diverse Teams with Common Goals

After the first day of class, students complete a Google survey identifying their top two strengths from a list of five skills described in the App: being proactive, teamwork, time management, management and organization, and interpersonal communication (additional skills are available within the App). By having students read through the skill descriptions, students have a normalized understanding of what is meant by each role. Once the results of student strengths are obtained, student responses are sorted based on their reported strengths. Students who identify the same skill as their top strength are initially grouped together. Then, the instructor

goes through the list from top to bottom, assigning each person to a sequential team number. In this way, every student sharing the same skill strength finds themself on a team with a unique set of strengths. Once the teams are formed, students work together to complete an initial Team Goal Plan by identifying a team name, creating shared goals, and finding strategies for how each person's voice will be heard. The Team Goal Plan is available in this QUBES resource file contents.

Integrating the App

During the third week of the semester, students learn how to use the Project Leadership App by watching this video. For the next three weeks, students select a skill and role that they will focus on for the week and provide constructive feedback to each other at the end of the week. Students switch roles and skills each week. They earn one point a week for selecting a role and skill; they earn two points a week for providing feedback to each of their peers. When points are not assigned, many students do not participate in providing feedback. In the middle of the semester, teams check in with how they are working towards their goals by completing an individual and team evaluation form, which is available as a file content in this QUBES resource. Engagement of students in this focused teamwork has positive effects in the classroom. One course assistant mentioned that the teams in the class were the most effective teams that they had seen.

Improving Office Team Dynamics and Communication - Bharti Kaushik

Registering on the App and then wondering how to use the app in the office environment devoid of class teaching situations involving students was a challenge that opened the possibility of using the defined roles and the suggested procedures for feedback, to improve the communications among the three member team. Although these challenges ultimately led to our group declining to use the Project Leadership App, the team decided to meet daily in the morning to distribute the task of the day with clear deliverables. An excel sheet was also created for the distribution of the task and providing feedback. This has greatly improved the clarity on deliverables and communication, though how to give feedback remained unclear.

Supporting Leadership Development in Community College Students - Heather Rissler Agriculture students at a community college in rural, North Iowa complete a biotechnology course. As part of the course, students develop an entrepreneurial mindset and use this skill to propose solutions for local agricultural issues that are important to them. Students will work in groups to complete a proposal for a biotechnology related solution that addresses a pain point. Project Leadership will be used to support formation and definition of roles for group members and to facilitate feedback on progression of the project. These skills will be beneficial for students as many of them have aspirations to start their own businesses and will assume leadership roles in the agricultural industry.