



Improving Student Experiences to Increase Student Engagement (ISE-2)

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Abstract

“Improving Student Experiences to Increase Student Engagement” (ISE-2) was awarded to Texas A&M University by the National Science Foundation, through EEC-Engineering Diversity Activities. ISE-2 is a faculty development program focused on reducing implicit bias and increasing active learning, with the goals of (a) increasing student engagement, success, and retention, and (b) ultimately seeing greater increases for underrepresented minority (URM), women, and first-generation students. Ten faculty teaching first- and second-year Engineering courses participated in the first cohort of ISE-2 in Summer 2017, which consisted of three workshops and six informal “coffee conversations”. At the conclusion of the workshops, each faculty was tasked with completing a teaching plan for the Fall 2017 semester, to incorporate the strategies and knowledge from ISE-2 into the courses they plan to teach. Focus groups with the ISE-2 faculty were conducted in Fall 2017 to obtain feedback about the faculty development program. Classroom observations were conducted using environmental scans and the Classroom Observation Protocol for Undergraduate STEM (COPUS)¹ to assess the classroom climate of faculty in the experimental (ISE-2) and control groups. Student surveys were also administered to students who were taught by ISE-2 faculty and control group faculty to assess student engagement and classroom climate. While the project is still ongoing, feedback from faculty regarding ISE-2 have been positive.

Introduction

The National Science Foundation, through EEC-Engineering Diversity Activities, awarded “Improving Student Experiences to Increase Student Engagement” (ISE-2) to Texas A&M University. ISE-2 is a faculty development program that focuses on reducing implicit biases and increasing active learning in the classroom, with the ultimate goal of increasing student engagement, success, and retention. Further, these positive effects are projected to be strongest for underrepresented minority (URM), women, and first-generation students. The project period is March 1, 2017 to February 29, 2020.

Regarding social cognitive biases, ISE-2 focused on two major components. *Implicit bias* consists of attitudes, beliefs, and stereotypes that we are not aware that we hold and, in turn, influence our actions in an unconscious and unaware manner. Implicit biases often reflect broader stereotypes and cultural narratives about groups and therefore behavior based in implicit biases seems correct or normal. *Intersectionality* acknowledges that individuals carry multiple identities that are intertwined. Additionally, systems of disadvantage and oppression based on demographic dimensions are intertwined. This section of the program is designed to demonstrate that specific fixes to address classroom concerns of specific groups is insufficient; instead faculty need to challenge themselves to think of ways to engage all students, rather than remove roadblocks for specific groups.

Active learning consists of students being engaged in course material beyond passive listening, such as reading, discussing, or writing. Active learning instructional strategies have been demonstrated to be effective in numerous studies and have been shown to reduce achievement gaps between white male and URM students, as well as first-generation students and students

from lower socio-economic (SES) strata. This was the second major component of the ISE-2 grant, because it provides a set of tools to make the classroom more engaging, the teaching more effective, and the pedagogy more inclusive. The ISE-2 hypothesis and implementation plan are summarized in Figure 1.

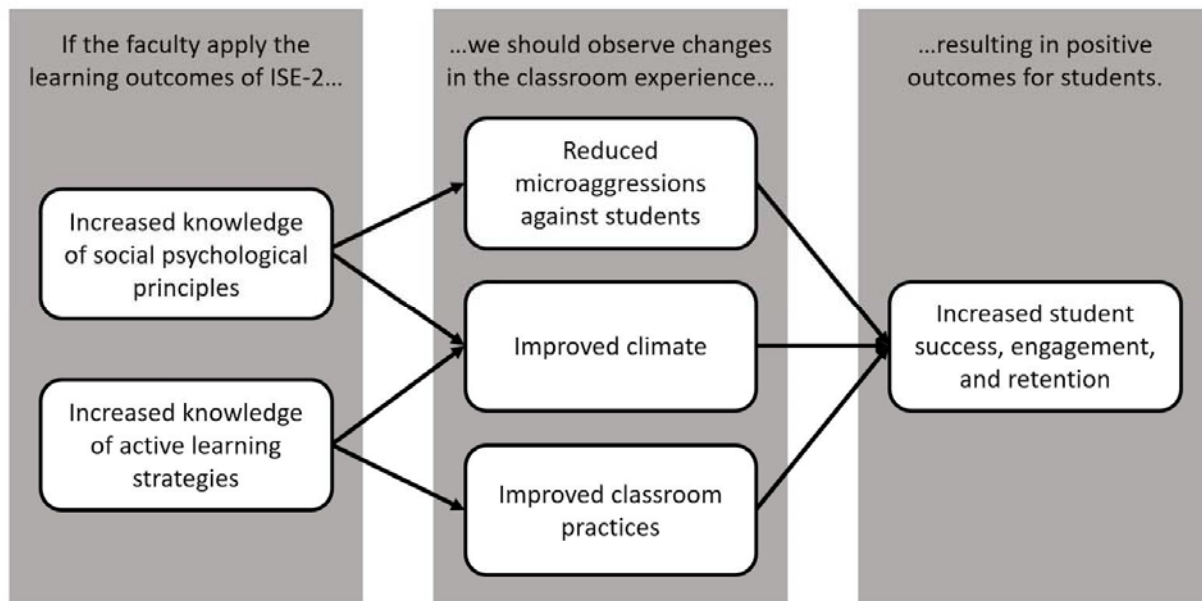


Figure 1. ISE-2 Conceptual Model

ISE-2 Participants

Ten faculty joined the faculty development program in the first year. They were recruited through a stratified random selection process. All teach first- and second-year engineering courses at Texas A&M University. The first cohort participated in ISE-2 in Summer 2017 and were projected to teach a total of approximately 1200-2400 students in the following two academic years.

ISE-2 Program Design

During Summer 2017, the recruited faculty participated in the ISE-2 faculty development program. The program consisted of two major components: three workshops (2-3 hours) and six informal “coffee conversations”. Attendance was mandatory for the workshops, but the faculty were allowed to choose which coffee conversations they wished to attend.

ISE-2 Workshops

Workshop #1 (early May) began with an overview of the program and a framework for teaching in a diverse classroom. The session primarily focused on social cognitive biases and resultant the behaviors that arise from them, including topics like implicit and explicit bias and microaggressions.

Workshop #2 (mid-May) covered theoretical foundations of how students learn, and evidence of the need for active learning strategies. Participants were introduced to simple to more complex strategies they could incorporate into their courses.

Workshop #3 (early August) refocused on the framework for teaching in a diverse classroom and preparation for applying the program material to establish student-centered instruction.

Faculty were provided with readings before each workshop as an introduction to each topic.

Coffee Conversations

Between the second and third workshops, near-weekly coffee hours were held to encourage continued engagement with the program and the material. These six coffee hours fostered conversation among the program members regarding the ISE-2 topics. The majority of faculty members attended at least one session. Session topics included: teamwork; informal assessment; implicit bias in exam questions; microaggressions; study skills; and, preparing for course redevelopment. Many of these topics were participant-driven and the result of feedback provided to the ISE-2 project team at the conclusion of workshop #2.

Teaching Plans

At the conclusion of workshop #3, the faculty were tasked with completing a teaching plan prior to the Fall 2017 semester. The teaching plan was an opportunity for the faculty to incorporate strategies and knowledge from the workshops and coffee conversations into the courses they currently teach. Subsequently, the ISE-2 team provided feedback to the faculty in regards to the teaching plans.

Evaluation Plan

Focus Groups

Focus groups with the ISE-2 faculty were held in October and November 2017 to obtain feedback about the faculty development program and learn about faculty experiences implementing and applying the ISE-2 strategies and information. They provided feedback regarding the required readings, workshops, and coffee hour conversations. Additionally, the faculty provided suggestions for improving the faculty development program for the second cohort (Summer 2018). Future offerings of the summer program and the number of participants in such offers are still being considered.

Classroom Observations

To assess the classroom climate of the ISE-2 faculty, classroom observations were conducted using Environmental Scans (detailed notes of classroom interactions) and the Classroom Observation Protocol for Undergraduate STEM (COPUS)¹. These classroom observations were conducted for the ISE-2 faculty and non-ISE-2 faculty (i.e., control group) teaching first- and second-year engineering courses. For each classroom observation, two members of the ISE-2 project team attended a class session and described instructor and student behaviors according to the Environmental Scan and COPUS protocols. Baseline measures were taken for both the experimental (ISE-2) and control groups during Spring 2017, prior to the implementation of the ISE-2 program. Classroom observations for both experimental and control groups were also

conducted in Fall 2017 and will be conducted in subsequent semesters. These observations allow the ISE-2 project team to understand the extent to which ISE-2 faculty have changed their instructional practices and whether the instructional practices of the ISE-2 faculty differ from those of non-ISE-2 faculty.

Student Surveys

Students who were taught by ISE-2 faculty and by faculty in the control group were administered surveys about student engagement and classroom climate. During the data analysis process, the ISE-2 project team will compare student reports of engagement and classroom climate in classrooms taught by ISE-2 faculty versus comparison classes. A survey for junior students was also administered in Spring 2017 and will be administered in the Spring semesters of subsequent years. This survey broadly examines student engagement and classroom climate in the College of Engineering. The goal is to determine if there are changes in juniors' experiences pre-/post-implementation of ISE-2.

Student engagement in the classroom is measured by the Student Experience in the Research University Survey (SERU-S)². Classroom climate is measured by the Critical Incidents Questionnaire (CIQ)³, items from the Diversity Survey Menu^{4, 5, 6, 7}, and items regarding the extent to which students observed or experienced microaggressions⁸.

Student Success and Retention

Lastly, student retention and success in the College of Engineering will be examined by evaluating student grades and retention. This step will be taken during the 2nd and 3rd years of the ISE-2 faculty development program. These analyses will assess whether participation in ISE-2 faculty-led classes influence student success and retention in the College of Engineering.

Future of ISE-2

A second cohort of faculty will be recruited to participate in the faculty development program in Summer 2018. This cohort will participate in workshops and coffee conversations similar to the ones administered in Summer 2017. They will also participate in focus groups in Fall 2018.

Discussion

The ISE-2 project is a two-pronged faculty development project, simultaneously tackling the topics of active learning and implicit bias. These topics are presented as being complementary to each other, because classroom climate and student engagement are intimately related. In order to successfully engage students in a welcoming classroom, faculty need to understand the underlying social cognitive principles of bias in the classroom and be willing to address their own biases, as well as the biases of the students and faculty around them. At the same time, faculty can greatly improve student engagement in groups that historically have faced challenges in retention (e.g., URM students, first-generation students, and students who are low-SES) through active learning strategies.

In the ISE-2 development project, the faculty participants are equipped with information on how implicit bias and active learning impact the Engineering classroom. Furthermore, they are taught how to implement changes to their classroom to increase engagement and inclusion. The faculty

are supported by the project team and their cohort of fellow faculty participants as they tackle challenging issues that they face in the classroom (e.g., incorporating active learning and technology, including formative assessment throughout the course, avoiding implicit bias when writing exam questions, how to implement teamwork successfully).

The different components of the ISE-2 faculty development project (e.g., pre-workshop readings, workshops, coffee hour conversations) all serve different, but complementary, purposes. The pre-workshop readings served to familiarize faculty with concepts that would be discussed in depth during the workshops. The workshop content built upon the pre-workshop readings and focused on implicit bias and active learning. During the workshops, faculty were given opportunities to reflect on, discuss, and apply the information being presented. After having time to reflect on the material presented in the workshops, coffee hour conversations provided an opportunity for deeper discussion, the sharing of resources and teaching strategies, and continued support from colleagues interested in improving engineering instruction.

The components of the project are also dynamic and evolving in response to feedback from faculty participants. For example, several topics in the coffee hour conversations were selected based on interests identified by faculty at the conclusion of the second workshop. Thus, the project team used the coffee hour conversations as an opportunity to address the explicit needs of the faculty participants. Furthermore, the program experienced by the second faculty cohort, in Summer 2018, will be a refined version of the original program, based on the feedback provided by the initial cohort of faculty participants.

Throughout the course of ISE-2, the project team has met weekly to discuss the process of crafting each project component and the overall progress of the project. During these meetings, the project team has made adjustments to ISE-2 in order to accommodate new information learned throughout the different stages of the project. Thus, the evaluation components of ISE-2 have also changed and developed as a means to address certain needs that appeared during the course of the project. An example of this dynamism occurred when the project team realized that the behavioral codes found in the COPUS were not able to capture the full spectrum of faculty and student behaviors that were projected to emerge as a result of ISE-2. In response to this deficiency, new emergent COPUS codes for both instructors and students were developed by the project team in order to more fully record the instructor and student behaviors during classroom observations.

Conclusion

While it is too early in the project to determine if our goals of increasing student engagement, success, and retention have been met, feedback from faculty regarding the professional development component has been positive. At the conclusion of the workshops and coffee conversations, faculty requested additional information sessions that were subsequently held during the fall semester. Additionally, some requested the opportunity to participate in the sessions again with the new faculty cohort. Faculty also suggested that coffee conversations could be held early in the semester, post-training, as an opportunity for faculty to discuss challenges they've faced in the classroom and troubleshoot active learning strategies with their cohort and the project team. The project team was also recommended to follow up with the

ISE-2 faculty during the semester to hold them accountable for implementing the changes that they wrote about in the teaching plans developed at the conclusion of workshop #3.

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