

## **Approaches for Efficiently Identifying and Characterizing Student Need Assessments in Two-Year Colleges**

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# **Approaches for Efficiently Identifying and Characterizing Student Need Assessments in Two-Year Colleges.**

## **Abstract**

This paper describes an approach that can be used by faculty and administrators to efficiently develop program-level student support plans to increase student retention and completion in STEM disciplines. These recommendations were developed as part of a National Science Foundation-sponsored workshop project intended to assist two-year college faculty and administrators to prepare proposals for the National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Program. S-STEM proposals are expected to be built on a foundation of deep needs analyses specific to the targeted population of students in STEM disciplines. Based on needs assessment, programs can then focus on implementing appropriate interventions and supports that will be most effective in improving the retention and completion of their students. Guidelines for streamlining the acquisition and organization of critical elements of student needs analyses can be useful for two-year college faculty and administrators to develop NSF S-STEM proposals and any other initiatives they may pursue to improve student success at their institutions.

Our approach recognizes that needs analysis benefits from three levels of data: institutional data, program-level data, and student-level data. Institutional-level data includes retention and completion data as well as results of institutional-level surveys of current students or alumni and the National Survey of Student Engagement (NSSE). Program-level data includes retention and completion data at the program level that may show significant differences from institutional results. In addition, program-level data should include course-level grades and failure rates, student GPA correlated with student program year, and student demographic data, if available. The program-level data can help identify attrition points at the program level.

Student-level data forms a third level that can clarify and focus student needs analyses. One aspect of student-level data is personal attributes associated with academic and career success in STEM fields. Examples include a growth mindset, STEM identity, a sense of belonging, and academic self-efficacy. The validated surveys that exist to characterize these attributes are outlined in the paper. These surveys can be used at the program-level to identify both baseline data and critical needs. In parallel with surveys, the creation of a student-need archetype using techniques from the NSF I-Corps for Learning (I-Corps L) model can be used to elicit another dimension of challenges faced by students. The I-Corps for Learning model emphasizes the benefit of unstructured one-on-one informal interviews to elicit unscripted data from students to test assumptions and uncover opportunities for impact. The paper provides guidelines for efficient implementation of I-Corps for Learning student needs discovery methods.

In summary, even with external grant funding such as NSF S-STEM awards, student support initiatives must allocate available funds strategically to obtain the greatest impact. Collection of data at institutional, program, and student levels can facilitate the synthesis of a student-need archetype that supports faculty and administrative decision-makers. This paper aims to provide a practical overview to two-year college faculty and administrators for creating a thorough student needs assessment and characterization of institutional context.

## Introduction

This paper describes an approach that can be used by faculty and administrators to help characterize student needs. Characterizing student needs is essential in efficiently developing program-level student support plans for increasing retention and completion in STEM disciplines. An overview is provided herein to help faculty, staff, and administrators in two-year colleges to identify sources of data that can be used to inform plans for student support.

The need to improve STEM education in the United States, particularly in the area of retention and timely degree completion, is well established [1]. A wide variety of educational practices and interventions have been developed and identified as effective in improving retention and completion. These practices include peer tutoring, supplemental instruction, summer bridge programs, research participation, learning communities, problem-based learning, remedial instruction, and contextualized learning [1-4].

The wide range of effective practices represents a challenge for faculty, administrators, and staff, particularly in two-year colleges, in selecting and identifying which of the many possible interventions might be appropriate for programmatic improvement in their institutional environment. The process of deciding which practices to implement and the allocation of time and resources to implement them should ideally be informed by data characterizing the particular problems to be addressed. Otherwise, faculty and administrators adopting an education practice to improve retention and completion may simply be taking an ill-informed “shot in the dark” that the intervention will achieve the desired impact.

This paper provides an overview of data sources that can be used to inform interventions. We develop the approach that sources of data can be classified into three levels. These are institutional, departmental or programmatic, and student-level data. A thorough analysis of student needs in a particular program is most effective if available data at all these levels is consulted.

The approach to characterizing student needs described here was developed as part of a series of workshops [5, 6] to assist faculty and administrators from two-year colleges and other institutions with limited resources to develop proposals to submit to the National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM) [7].

The goal of the S-STEM program is to enable academically talented, low-income students to pursue successful careers in promising STEM fields. Through a competitive proposal process, S-STEM provides institutions with awards, depending upon program track, of up to either \$2M or \$5M to be used to provide scholarships and other support to students in STEM disciplines. The NSF S-STEM program seeks to increase the number of students who graduate with an S-STEM-eligible degree and contribute to the American science and technology economy. The program provides awards to institutions of higher education not only to fund scholarships but also to adapt, implement, and study evidence-based curricular and co-curricular activities that

have been shown to be effective in supporting recruitment, retention, transfer, student success, career pathways, and graduation in STEM [7].

S-STEM proposals must include a description of the intended program of student support and explain how this support is based on a "deep analysis of local needs" that provides a complete picture of what the students need [7]. It is expected that "evidence-based interventions should be clearly linked to the needs identified and the target student population [7]." S-STEM proposals are expected to demonstrate that they are solving the right problems that are affecting student retention and degree completion.

Faculty, staff, and administrators at two-year colleges tend to face extreme demands on their time. They also frequently handle a wide range of on-the-job responsibilities. An efficient approach to aid them to identify and acquire the comprehensive data needed to carry out a "deep analysis of local needs" could be of substantial value.

An efficient approach to obtaining data characterizing student needs is useful to all two-year college faculty, staff, and administrators planning student support to increase student success, not only those applying for NSF S-STEM grants. This paper is intended to serve as a resource guide to help the two-year college community save valuable time in understanding student needs when planning programmatic improvements.

## **Institution-Level Data**

Institution-level data can provide a useful context and a big-picture view of potential areas of student need. Institution-level data includes institutional retention and completion statistics, major nationally-normed surveys such as the National Survey of Student Engagement (NSSE), and an institution's survey of graduates.

### *Institutional Retention and Completion Data*

At the highest level, institutions track and report retention and degree completion rates. Institutions typically report first-to-second-year retention as well as completion rates. Two-year colleges typically use 2- and 3-year completion rates. However, they are also grouped along with 4-year institutions reporting national 6- and 8-year completion rate data [8]. Transfer rates and dropout rates are also frequently monitored. Given the extremely heterogeneous nature of two-year colleges and their student bodies, retention and completion rates tend to be low. The national average for 6-year completion at community colleges is about 40 percent [9].

Nationally, about a third of students who began at a community college transfer to a four-year institution within six years (31.2%) [9]. About half complete a bachelor's degree (49.1%) or 15.3% of the initial cohort. Only about ten percent of lower-income students who began at a community college are successful in completing a bachelor's degree within six years (10.6%) [9].

Two-year colleges, completion, and transfer rates, if available, are of limited usefulness due to the overwhelming impact of the wide range of students attending. However, institutional completion and transfer rates can provide a useful baseline for comparison with particular

programs within that institution. Institutional completion and transfer rates provide an indication of the context in which any particular programmatic improvement must operate.

### *National Survey of Student Engagement (NSSE)*

Other aspects of institution-level data can provide a useful context and a big-picture view of potential areas of student need. Another source of institution-level data is the National Survey of Student Engagement (NSSE) [10]. NSSE is intended to measure the level of student participation and student engagement. It is a nationally-used survey, with 354,067 students taking the survey in 2023 [10]. The widespread use of NSSE affords the opportunity for comparisons to peer institutions, and the long history of the NSSE permits longitudinal analyses of a given institution.

The NSSE survey addresses four general topics: academic challenges, learning with peers, experiences with faculty, and campus environment. The NSSE also measures student engagement with six high-impact practices that are known to be associated with positive outcomes on student learning and retention [11]. The engagement in practices measured by the NSSE survey are learning community, service-learning, research with faculty, internship or field experience, study abroad, and capstone project.

Also included in NSSE is the extent to which students report that they have used learning support services such as tutoring services or a writing center. Students are asked the extent to which the institution has proved supportive of their overall well-being in areas such as recreation, health care, and counseling and if they were able to obtain help to manage non-academic responsibilities such as work and family. Students are asked if they feel like part of the community at their institution.

As an institution-level data source, the NSSE, if used, can provide context and institutional baseline data. NSSE provides an opportunity to compare with peer institutions, which is one way to identify specific areas of interest. A concern with NSSE is that results reflect an institution-wide average and are not likely to capture the circumstances of an individual program or department. The experience of students in a specific department or program could vary significantly from the institutional norm reported in NSSE.

### *Graduate Exit Surveys*

Many two-year colleges employ some form of a graduate exit survey. Typically, students applying for graduation are required to complete a graduate exit survey. These surveys frequently include questions about the students' intended degrees, perceptions of their experience at the institution, and their future educational or career plans. Exit surveys may include data on the extent to which students feel their experience at the institution contributed to their development of broad learning skills, analytical skills, critical thinking skills, communication skills, interpersonal and relationship skills, and goal setting. Questions may include how satisfied students are with the educational services at the institution.

A main strength of these exit surveys is that they provide relatively low-resolution data on general aspects of the student experience. Students are usually tracked by the program from which they are graduating, so given a sufficient number of program graduates, results may be

available at the departmental or programmatic level. This may facilitate broad measures of the student experience in a specific program.

An issue with graduate exit surveys is that, by definition, data is only acquired for students who have successfully completed a program. Non-completers and those who transfer without completing a degree are not surveyed. Data regarding issues that may have precipitated program non-completions and withdrawals are not obtained.

### **Department or Program-Level Data**

Department or program-level data is information that is available for a particular STEM department, such as chemistry or engineering, or specific programs within a department. Programs might include STEM degree or certificate tracks such as electromechanical technology or manufacturing technology.

Departmental-level data is generally available for relevant quantitative academic indicators such as course grades, student enrollment, and student overall grade point average (GPA). Usually, detailed departmental-level data is accessible through an institutional office such as the Office of Institutional Research or Institutional Data Office. Individual faculty and administrators typically can request detailed departmental-level data through these offices.

Departmental data might be viewed from two perspectives. One is to look at the trajectory of a student through the program. The other is to identify fixed points in the program and examine the flow of students through these points. Both views can be used to identify and characterize student needs.

#### *Student Progression Data*

Data related to student progression shows what happens on a longitudinal basis as students progress through the program. This includes the total enrollment of students in each year of a program. Year-to-year retention can help identify dropout points. The two-, four-, or six-year completion rates in a program, as relevant to expected program duration, are obviously important indicators of potential areas of student need.

The average GPA of students enrolled in a program can be a useful indicator of academic success and help identify specific areas of need. In particular, average GPA can be tracked for students in the first year of the program, the second year, and so on until completion. For example, observing significant drops in average GPA for students in a given year can be an insightful indicator.

Reviewing these departmental data for several years can be a valuable exercise. Changes over time in first-to-second-year retention, average student GPA in a given program year, and program completion rates may help identify specific events related to student success.

#### *Departmental Fixed-Point Data*

Another perspective on departmental data is to look at student outcomes at certain fixed points in the progression of students through a particular program. Average student grades or D, F, or withdrawal (DFW) rates for specific courses are useful indicators. Clearly, this approach can identify specific courses or types of material that prove problematic for students, indicating areas that deserve attention for improvement.

Many STEM degrees or programs involve prerequisite courses in other departments. Mathematics courses are a major example in this regard. It can be helpful to track the performance of students in these prerequisite courses. Mathematics plays a significant gatekeeper role in some STEM fields [12].

Certification or standardized examinations external to the institution are another source of departmental-level data. If the degree involves certification or other standardized exams, average scores or pass rates can be monitored. As these are external to the institution, departmental results can be referenced to national standards.

Data for DFW rates in courses and certification examination results can also be viewed historically, providing information about trends over time.

#### *Subgroup Results*

It can be useful to examine the departmental data mentioned above for particular subpopulations. This might include women, low-income students, or members of other groups underrepresented in STEM disciplines. Pell eligibility is a common characteristic used to determine low-income status. Results for these subgroups can be compared to departmental results for the entire population of students served. This can help to identify challenges faced by particular subgroups.

#### *Extracting Signal from Noise*

A challenge with departmental data is identifying meaningful results and trends from what can be a very large amount of data. Data for any one academic year data of potential interest include year-to-year retention, average GPA for students in each program year, completion data, average grades or DFW rate in specific program and prerequisite courses, and certification exam pass rates. All of these data can also be viewed over multiple years, seeking insights revealed in historical progression. The amount of data is further compounded by multiplying all of this information by a number of potential subgroups frequently of interest, such as low-income students or members of other groups underrepresented in STEM. With this considerable amount of data, it can be challenging to identify signals of interest within the background noise of a large amount of information.

### **Student-Level Data**

Student-level data is a term we use for data that must be obtained directly from students in a particular program by a specific effort. Institutional-level data and departmental or program-level data are generally gathered somewhat automatically either through the normal process of recording enrollment and grades or institutionalized procedures such as administering institution-wide surveys like NSSE or graduate exit surveys. For this type of information, the

data generally exists, and faculty and administrators seeking to identify and characterize student needs must request or otherwise compile existing data. Student-level data to be described below must be obtained by deliberate effort by faculty or administrators directly from students in the program in question.

#### *Validated Instruments for Relevant Attributes*

One aspect of student-level data is personal attributes associated with academic and career success in STEM fields. Examples of these affective characteristics include a growth mindset, STEM identity, a sense of belonging, and academic self-efficacy. It can be helpful to characterize these for a particular population of students. Interventions such as research participation, tutoring, or internships can then be more readily identified, which might help to improve these feelings and attitudes among the students, leading to greater success in STEM retention and degree completion.

It is possible to quantify some of these student beliefs and attitudes through validated instruments that have been developed to measure specific characteristics. These instruments frequently take the form of survey-like questions that can be given to students. These instruments can be used to identify areas of critical need, establish baseline values, and quantify post-intervention improvements.

Instruments accepted as validated must establish both reliability and validity. Reliability is an indication of consistency. The same results are obtained when the instrument is used to measure the same thing repeatedly. Validity consists of several dimensions, including the extent to which the questions cover all the relevant topics of the objective, the degree to which systematic error is controlled, the extent to which it is possible to generalize the result to the target population, and how well a set of indicators represent a concept that is not directly measurable. In addition, instrument validity is typically established for a population with a shared set of characteristics (such as college undergraduates), so attention must be paid to the test population for which a particular instrument has been developed.

In this section, several relevant instruments are described. Priority is given to instruments that can be obtained from readily available sources cited and can be implemented in survey form.

#### Academic Self-Efficacy

Self-efficacy describes a person's belief that they can complete tasks successfully and accomplish their goal. Academic self-efficacy refers to a student's perception that they can be successful in academic tasks such as problem-solving. High academic self-efficacy is associated with a higher likelihood of persistence, higher academic achievement, and confidence in handling the stresses of undergraduate education.

A well-established self-efficacy scale has been developed by Schwarzer et al. [13,14]. This is a 10-question instrument. It measures the strength of a person's belief that they can respond to novel or challenging situations and to handle obstacles or setbacks. The questions can be answered in two or three minutes. Another option is the General Academic Self-Efficacy Scale developed by Zyl et al. [15]. This instrument has five questions and is a valid and reliable



measure of a student's global belief in their ability to master academic challenges at the undergraduate level.

### Sense of Belonging

A sense of belonging refers to a feeling of being a part of something bigger. In college students, a sense of belonging relates to the student's feeling of being included in the broader academic community. A sense of belonging influences motivation and participation in activities. A sense of belonging is associated with retention and success. Malone et al. have developed a General Belongingness Scale [16]. This is a 12-question scale that was developed to assess a sense of general belongingness. Slaten and coworkers developed a 24-question measurement of belongingness that includes measures of perceived social support, social connectedness, and general belonging [17].

A sense of belonging is particularly relevant for students from underrepresented groups. More detailed studies are available discussing sense of belonging and describing other existing instruments for sense of belonging measurement [18, 19].

### Growth Mindset

Growth mindset is a belief that abilities and intelligence can be developed through deliberate effort. Growth mindset is associated with academic performance and successful adaptation to difficult or challenging life experiences. An early influential and widely used growth mindset instrument was developed by Dweck and coworkers [20]. Another growth mindset instrument is a short 3-question measurement developed by Rammstedt et al. [21].

### STEM Identity

This attribute is a measure of the extent to which students perceive themselves as members of the Science, Technology, Engineering, and Mathematics (STEM) community and see STEM as a key aspect of their personal identity. Students with a high degree of STEM Identity have greater persistence, engagement, and accomplishment in STEM fields.

Validated tools are available for characterizing STEM identity in undergraduates. McDonald et al. have developed a very short one-item measure for assessing STEM Identity [22]. A similar instrument has been created by Lockhart [23]. They report a valid and reliable instrument that accurately measures STEM Identity, and this attribute was the single best predictor of a student's interest in pursuing a STEM degree.

### Imposter Syndrome

Imposter Syndrome is a persistent behavior in which a person doubts their abilities and is afraid of being exposed as "fraud" even though clear evidence exists of their accomplishments and abilities [24]. It is a particular issue among individuals from underrepresented groups. Impostor syndrome can produce a significant adverse influence on a student's well-being.

Validated and widely used instruments are available to assess imposter syndrome in college students. The Clance Impostor Phenomenon Scale is a 20-question survey to help individuals determine whether or not they have impostor syndrome characteristics and, if so, to what extent

[25, 26]. Kolligian studied students' inaccurate self-perceptions of incompetence and developed another measurement instrument for impostor syndrome [27].

This section was intended to highlight validated instruments to measure attributes relevant to the persistence and success of STEM undergraduates. The development of valid instruments to measure attitudes and beliefs is an active area of research. Other information about potentially relevant instruments can be found at [28-30].

#### *NSF Innovation Corps for Learning Approaches*

Methods developed through the National Science Foundation Innovation Corps (I-Corps) and Innovation Corps for Learning (I-Corps L) can be applied to provide an additional "ground-truth" student perspective on student needs and help to focus resources and interventions in areas of greatest potential impact.

#### NSF Innovation Corps (I-Corps)

The National Science Foundation developed the NSF Innovation Corps (I-Corps) to assist researchers interested in commercializing the results of their NSF-supported work. The goal is to help maximize the impact of NSF-supported research by translating research results into viable products as quickly as possible. The mission of I-Corps is to reduce the risk associated with translating technologies from the laboratory to the marketplace. To date, the NSF I-Corps has produced 1357 startup companies, which have cumulatively raised \$3.16 billion in subsequent funding [31].

Central to the NSF I-Corps is the application of the "lean startup" approach developed by Steve Blank and other technology entrepreneurs [32]. The lean startup involves a "customer discovery" phase. Customer discovery centers around unstructured and unscripted in-person interviews of potential customers to discover actual customer needs. Frequently, unexpected insights emerge from customer interviews. Customer discovery helps refine product-market fit and ensure that the startup is not developing a product that fails because it does not meet the actual needs of potential customers.

#### Innovation Corps for Learning (I-Corps L)

The Innovation Corps for Learning (I-Corps L) adapted the I-Corps approach to help increase the impact of NSF research from the education directorate. I-Corps L emphasizes the use of interviews to help investigators align their proposal outcomes with the needs of constituents and enhance the potential for broader impacts [33]. In the case of educational projects, constituents can include administrators, faculty members, students, and employers. The lean startup "customer discovery" interviews are still used, but in this case, the "customer" is broadly defined as an end-user or beneficiary of the educational innovations, such as students [34-36]. I-Corps L advocated using the same techniques used by startup companies to identify customer needs [37, 38] but applied to educational end users such as students.

#### Customer Discovery and Student Archetype

The I-Corps L customer discovery process can be used as another source of student-level data to help align student support strategies with areas in which they will have the greatest impact. Informal, unstructured interviews are conducted with students in the targeted group to identify

impediments to retention and degree completion, as well as student strengths and assets. Ideally, a pattern emerges from these interviews and is summarized as a "customer archetype" or, in this case, a "student archetype." The customer archetype or composite typical customer can be used as a way of summarizing results from student interviews.

Student interviews are intended to be unstructured and informal, but it is helpful to have prompts to stimulate dialogue. Typical recommended prompts are given below [37, 38]:

- What are the student's short-term goals?
- What are the student's long-term goals?
- On a daily basis, what are the challenges the student faces?
- What are the student's professional (STEM and career-related) challenges?
- The student's personal challenges include:
- Challenges to retention in STEM and completion are:
- In their spare time, the student enjoys?
- The student is interested in topics such as:
- The student's daily life includes routines like:

In addition to one-on-one interviews, focus groups have been found to be effective in eliciting areas of need from students. For focus groups, it is essential to have a trained and independent facilitator who can lead the discussion and encourage participation and candid responses without influencing or introducing bias. Some types of questions that can be used in focus groups include:

- Why were you interested in studying (this field)?
- What strategies do you use to manage your course load?
- How did you learn these strategies?
- Do you see any barriers to your academic success, either from the department or college perspective?
- Are there services or programs that the college could have offered you earlier in your academic career to better aid in your success? Describe what those would have been.
- Were there services or programs that the college did offer that helped to aid in your success?
- Did you ever think about switching out of (this field)? What kept you in the program?
- What do you do outside of academics?
- Do you work? If so, why?
- What advice would you give to an incoming freshman on how to be successful in (this program)?
- Is there anything that I haven't asked you that I think I should know?

The customer discovery process helps to ensure that students' voices and "ground truth" are included in the process of identifying areas of student need. Customer discovery can help clarify issues that faculty may have perceived but not fully appreciated. Examples of student needs identified by students and communicated to faculty engaging in the customer discovery process include the following:

- Problem with a required class held at night ending after the end of parts of the public transportation system.
- Inadequate advising information resulted in confusion about course requirements and course sequencing.
- Confusion and apprehension about the process for seeking internships.
- Significant anxiety about the choice of a subfield within a program.
- Extreme anxiety about instructional methods in a particular course.

Following one-on-one interviews and focus group results, surveys of students can be used to assess the extent to which opinions are more broadly held among the student body. The interviews and focus groups can unearth issues that help to inform survey questions. In addition, surveys can be used to help assess the student preferences or level of interest in particular options. For example, surveys might determine preferred hours for tutoring assistance or the number of hours devoted to part-time non-academic work.

### **Suggested Data Gathering Approach**

Each institution has a unique context, and the optimum set of data characterizing STEM student needs can vary widely. However, we offer the following general guidelines to faculty, staff, and administrators for an approach that can efficiently quantify student need, provide relevant baseline data, and point toward specific interventions.

Institutional-level data can first be used to provide overall context. For example, an open access enrollment two-year college with a 24 percent completion rate is a different educational environment from a private selective four-year college with an 88 percent completion rate. Institutional data provides an essential initial perspective.

Interventions frequently occur at the departmental level. Departmental-level data should next be acquired as a baseline from which goals can be established. Completion data at this level shows if a department is above or below the institutional average. Even if a department is above the institutional average, usually room for improvement exists. For example, an intervention such as an undergraduate research experience would be expected to generate some improvement, relative to the departmental baseline. Course-level data on student success should be gathered at critical programmatic milestones of student progress such as challenging foundational courses like organic chemistry or engineering statics or critical prerequisites such as mathematics.

Lastly, student-level data should be used to help clarify specific needs and align particular interventions with need profiles. Cautions should be exercised to avoid overburdening students in this process. However, validated instruments, customer discovery through interviews, focus groups, specialized surveys at the student level should be used to help to determine promising interventions to most directly impact student issues such as a sense of belonging, self-efficacy or specific challenges in being successful with critical coursework.

## Summary and Conclusions

This paper aims to provide a practical overview to two-year college faculty and administrators for creating a thorough student needs assessment and characterization of institutional context. Developing a “deep analysis of local needs” and showing that evidence-based interventions are “clearly linked to the needs identified and the target student population” to prepare competitive NSF S-STEM proposals can be a challenging process for two-year college faculty, staff, or administrators. Whether using external grant funding such as NSF S-STEM funds or an institution’s own internal funds, student support initiatives must allocate available funds strategically to obtain the most impact. Collection of data at institutional, program, and student levels can facilitate the synthesis of a student-need archetype that supports faculty and administrative decision-makers. Institutional-level data, such as an institution's retention and graduation rates, NSSE survey results, and graduate exit survey data, can provide context for similar data at the program level. Department and program-level data such as year-to-year retention, completion, and average GPA, along with information such as DFW rates in program courses, critical prerequisites, and certification exams, can help to isolate potential areas of interest at the program level. Department and program-level insights can be furthered by examining historical trends and results for subgroups such as low-income students or underrepresented groups. Data at what we call the student level can help to pinpoint and clarify specific areas of student need to help with precise alignment of interventions. Student-level data includes the results of surveys using validated instruments for attributes and beliefs such as academic self-efficacy, sense of belonging, growth mindset, STEM identity, and imposter syndrome. In addition, using the NSF Innovation Corps for Learning interview process ensures that the perspective of the students is represented in identifying the needs of the targeted population of students.

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