



## Non-engineering Students: Year 2

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## Engineering Students in a First-Year Cohort Program of Mostly Non-engineering Students: Year 2

### ABSTRACT —

This Complete Evidence-Based Practice paper reports on the second iteration of a first-year cohort program called STRIDE developed at the University of Hartford. Upon review of applications for the program and selection of students each year, it has become apparent that engineering students have represented over 30% of the student population in each of the STRIDE cohorts thus far. This cohort program which is for all majors would have welcomed almost any ratio of representation from students entering the engineering college or other colleges at the university. STRIDE is for all majors. The program continues to build on its efforts in supporting a diverse pool of scholars, in part by stimulating the retention and success of Black/African-American and Latino/Hispanic male students during their first year at the university. While the paper endeavors to describe the program, various quantitative and qualitative metrics are presented which support assessment of the efforts. The main focus of the present work is to discuss these elements of the program, and highlight student performance through the lens of engineering vs. non-engineering students in the program. While first year programs specifically for engineering students may be valuable, there could also be value in analyzing the impact of non-STEM oriented programs on engineering students' retention and success. Alternatively, this approach may highlight deficiencies which may be used to inform STEM-based or discipline-specific cohort programs. The paper discusses 1) the implementation of the program, changes and improvements made from Year One to Year two; 2) success garnered by the first Cohort, only fully quantifiable after completion of the first year and start of the second year; 3) life after the first year for students who were a part of Cohort 1, and 4) success of students in Cohort 2. It should be noted that due in part to the experiences and success reported in Cohort 1, Cohort 2 was doubled in size. The goals and associated success indicators of the program, how they were met, and how they continue to be measured and monitored are described here. GPAs were a primary metric, with STRIDE students having aggregate GPAs 20% higher than their counterparts in a control group. Credit completion was another important metric, with STRIDE students in Cohort 1 completing 20% more credits than their counterparts. First-year retention rate for Cohort 1 was ~6% higher than their counterparts. It is hypothesized that with the combination of approaches offered in the STRIDE program, students will continue to achieve higher GPAs in their first semester, and subsequently retention data on the cohort will be higher than comparison groups, in the second semester, in the second year, and beyond, culminating in higher graduation rates. Thus far, results presented here for Cohort 2 support this hypothesis.

### Introduction

*What factors impact retention, attrition, and graduation?*

It is important to identify factors that may lead to attrition or retention in STEM education, and also to explore approaches that can be utilized between enrollment and graduation to encourage student success. The present study focuses on a mixture of approaches that are being utilized to encourage retention and success of a cohort of Black/African-American and Hispanic/Latino

male students who are part of a program called STRIDE at the University of Hartford. The cohort of students includes STEM and Non-STEM students. The approaches taken to address the needs of the students are the same for all of the students, regardless of their major. This paper describes performance of the cohort and then highlights students in the engineering college.

While aspects of university-specific environments could be considered, what has been reported in literature in various studies is that high school preparation and ranking is a factor which can have a large impact on retention through the first year of college up to and through graduation [1-3] [4]. Such results have encompassed STEM students [1-3]; business students [3]; emphasis on underrepresented minority (URM) students[4].; and more [2, 3].

For example, a team out of University of North Texas (UNT), tracked cohorts of students through a seven-year continuum, in their three largest “majors”– STEM, Business, and Education – to discern the number of students dropping out of the university, switching majors, and/or graduating. Upon also disaggregating the data based on gender, ethnicity, county of origin, and high school ranking, they concluded that high school ranking was consistent with predicting matriculation [3].

Some models have sought to exclude well-known predictors of academic success such as high school rank, and instead look at other precollege characteristics perceived to influence the academic success of first-year students, such as gender and ethnicity, or whether or not parents were separated, and environmental influences, related to the institution and or residence [2]. For example, a pilot study at a Midwestern land-grant Research I institution, Iowa State University, had ~1200 participants, 31% of which were enrolled in the College of Engineering, and investigated the efficacy of an alternative model to predict academic success, concluding that students' self-rating of their abilities plays a large part in their academic success; students involved in leadership positions do not do as well, and students involved in learning communities performed better academically [2].

Chiang et al. [4], who studied longitudinal data on 3670 students, of which 44.5% were identified as URM students, are among the many researchers and educators that agree that academic preparation is important. Among a range of solutions, they offered that institutions could facilitate student networks that help navigate a STEM major [4]. For example, the use of cohorts, first year seminars, learning communities, and block scheduling have been utilized in retention efforts [2, 5], and have demonstrated ranges of success.

*Do cohorts, learning communities, first-year seminars, and/or block scheduling systems work?*

First-year seminars are a widely used retention tools, which can be defined as: a course specifically designed to equip new students with the knowledge, skills, and abilities that are necessary to successfully meet the different transitional and developmental challenges that are faced in the first year of college [6]. Permzadian and Credé [6] studied whether first-year seminars improve college grades and retention. They did a quantitative review on the empirical literature on hundreds of First-year seminars to identify evidence for their effectiveness. This work included 89 samples that examined the effect of FY seminars on first year GPA, and 195 that examined the effect of FY seminars on the first year retention rate. Their concluding

recommendations on the design of successful first-year seminars, included four steps for increasing retention and two for increasing student performance [6]. These recommendations are organized into Table 1.

Table 1: Tips in designing a first-year seminar (based on study by Permzadian and Credé [6]):

	<b>To improve 1- year retention:</b>	<b>To increase academic performance (GPA):</b>
<b>Type of seminar?</b>	Extended orientation	Academic (or hybrid, i.e., some academic component)
<b>Who should the instructor be?</b>	Faculty or administrative staff (rather than in part or in whole by undergraduate or graduate students)	N/a
<b>Which students to include?</b>	All incoming first-year students (rather than just those deemed to be academically underprepared)	N/a
<b>Stand-alone course vs. linked to learning community?</b>	Stand-alone course (FY seminars are less effective at increasing retention when they are part of a learning community)	N/a
<b>Best environment for implementation?</b>	N/a	2-year college (possibly due to greater proportion of academically underprepared students who stand to benefit)

It is interesting to note that the table indicates stand-alone courses as more effective for first year retention than those which are linked to learning communities. Still, learning communities, depending on implementation can have impacts, which many are interested in. While reasons for the success of learning communities have included that physical space, especially where students live, accommodates studying together, a criticism of learning communities has been the impact of self-selectiveness of students within these communities [2]. It should be noted that the UNT study also concluded that high school GPA was a factor that rendered participation in learning communities, relatively insignificant in impacting first-year college performance [2].

Still in looking at attempts to bring students together in ways that encourage group studying or other valuable interactions, cohort programs, first-year seminars, block scheduling, and learning communities can have an impact. The present study aims to present the structure of the first year program and also aspects of the curriculum that may or may not contribute positively to the first year retention. In studying the effect of cohorts on student retention in engineering, a study at SJSU, the oldest campus in the California State University system, had students in Fall 2015 from the College of Business, College of Engineering, and Child and Adolescent Development Department (CHAD) assigned schedules that included at least two shared classes with other

students (i.e., “block scheduling”) in their declared majors [5]. This study indicated that it had a positive impact on one-year retention of first-year engineering students, increasing it from near 87% in recent years to 90% after the block scheduling year [5].

### *Diversity in retention efforts*

What has also been reported in literature is that unfortunate disparities and barriers related to race must also be overcome [4, 7, 8]. Studies have focused on barriers to the success of Black and Latino STEM students [7, 8], including academic, social [7], and institutional barriers [8]. Strategies have been described for helping with student retention and success, including encouragement and maintenance of attributes like academic self-efficacy, confidence and resilience [9]. Traditional theories on retention such as that of Tinto [10], focus on the impact of adjustment, and adaptation to the dominant culture of an institution, in a student’s decision to remain there. However, culture and student perspective should also be valued and considered. Institutions that are more agile in doing this may be more successful at maximizing retention and success for wider numbers of students, with a range of backgrounds related to race, ethnicity, socioeconomic status, environment, and/or the intersectionality of these and others. For example, students from backgrounds that reflect first-generation college attendance can also face a range of similar (though not identical) challenges. While there can be various approaches to enhancing retention for students of all backgrounds, first-semester GPA may help better predict and encourage graduation for students [11-13].

### **STRIDE: A Cohort Program and a Course**

STRIDE has been described in a previous study [14], and is discussed in more detail here. It was first piloted in 2018, to support students during the fall semester of their first year at the university. The Program is supported by The Provost’s Office and related Student Retention Efforts. The goal of the STRIDE program was/is to support eligible Black/African-American and Latino/Hispanic male students in achieving academic excellence at the University. This was motivated in part by consideration of historical data on retention and success, and an interest and effort to improve the experiences of all of our students by finding ways to support various groups that make up the fabric of the university.

Students in the STRIDE Program take at least one class together, namely the STRIDE Dialogue course. After being accepted to the STRIDE program, students are registered into this 1-credit course at the university, which meets for 50 minutes each week. Hence STRIDE has program aspects and course aspects. This co-curricular approach has allowed for dynamic support and engagement of students. STRIDE’s supporting programming and events help augment what is covered in the course. Activities related to learning methods, mentoring, and leadership training, are used to help students adjust to college and work towards their related goals.

While the course itself meets once per week for 50 min, the programmed events vary in frequency and length of time, and have consisted of one-hour events; 3-hour sessions on professional development or learning methods; and even 8-hour study events. Upon observation of students in a STRIDE session on learning methods, one administrator described the STRIDE program as seeming like an academic excellence fraternity. Still, it should be noted that STRIDE was not established as an honors program, and there has not been a GPA requirement. Further

there is no cost to students for participation in the program. Students are accepted through a written application process, and the only prerequisite for the course is first-year level standing.

The STRIDE program has been successful in its focus on students in their first year (higher GPAs, higher credit completion, higher retention, and immense value-add to students as indicated anecdotally and through various metrics). As such, the program endeavored to and successfully doubled in cohort size (15, in 2018 to 29, in 2019).

Follow-up efforts are being considered for students in each Cohort after the first year is completed. The program (initially only a first-year program), is considering and developing initiatives at the sophomore-level (and above). This includes scholarships, workshops, and guided opportunities, to help springboard the students from each first-year cohort beyond retention and toward maintained success, continued personal growth, degree obtainment, and beyond. The goals and associated success indicators of the program, how they were met, and how they continue to be measured and monitored are described here. They include:

- a) GPAs – Cohort I had first-semester GPAs that are 20% higher;
- b) Credit Completion – Cohort I completed 20% more credits;
- c) Retention – Cohort I had a first-year retention rate ~6% higher;
- d) Other data – Cohort I rated the program a 5/5. Anecdotal feedback was also positive.

Cohort II data is presented and this paper further looks at all of these aspects through the lens of the performance of the engineering students, who represent over 30% each of the cohorts.

### **STRIDE, Shifting Momentum from Year 1 to Year 2**

Aspects of the program in Year I that were particularly effective, included the Guaranteed 4.0 session, the Peer Mentor program, the panel discussion, and the Study Blitz. This all led to the purposeful doubling of Cohort size, to potentially and quickly help more students, while also being mindful of constraints in people and capital resources. There were also changes and improvements made based on the monitored results:

- a) In response to GPAs –
  - Emphasis on study skills, techniques, learning methods, and stress techniques, have been enhanced. This includes increased efforts to monitor use of learning strategies.
- b) In response to Credit Completion –
  - Instructors and administrators of the program have worked in tandem with first year advisors to help students with schedules.
- c) In response to retention (and success) –
  - This is actively being monitored and will become clearer with time. Until then, increased efforts are being considered and developed to give students the tools they need to achieve their goals. One example is additional STRIDE programming after their first year, and scholarships. These efforts are underway.
- d) In response to other data–
  - Quantitative and qualitative feedback from instructors, students, and other stakeholders continues to result in alterations and updates to select aspects of the program. One example is the emphasis on icebreakers and cohort-building activity to help maximize the positive benefits of the group.

Student feedback in Year 1 was overwhelmingly positive as demonstrated by anecdotal feedback and teaching evaluations. Aspects of the program that were particularly effective, included the Guaranteed 4.0 session, the Peer Mentor program, the panel discussion, and the Study Blitz.

STRIDE. A brief description of these is offered below:

- Guaranteed 4.0 © – A system combining learning methods and other techniques to help students maximize their GPA
- Peer Mentoring – A support network which connects upperclassmen with STRIDE students.
- Panel Discussions – Connects students with diverse pools of alumni and professionals.
- Professional Development – Connect with corporate partners through resume reviews, mock interviews, job shadowing and more.
- Info-sessions and workshops -- Discuss scholarships and student financial assistance.

Results from the first year allowed for the highlighting of the following before the second year:

- Higher GPAs – On average STRIDE students achieved GPAs 20% higher than similar students not enrolled in STRIDE in the first semester
- Completing more credits – On average STRIDE students successfully completed 23% more credits than similar students not enrolled in STRIDE in the first semester

Planning after the first year allowed for the highlighting of the following before the second year:

- “3.5 Scholarship Challenge” – All STRIDE participants who successfully complete the program and have a GPA of a 3.5 or greater in fall 2019 will receive \$1000 in scholarship dollars EACH semester, for the next 3.5 years (starting from the second semester of their first year (Spring 2020)! Students with a GPA of 2.5 or greater, can also be considered for this scholarship, pending approval by STRIDE instructors, who may have added requirements such as well-developed improvement plans for the spring term.

Other changes:

- There was an increase in the number of applications
- Cohort 2 was doubled in number of sections, from one section to two sections
- Cohort 2 was doubled in number of students, from 15 students to 29 students

## **STRIDE, what was done in year 2?**

STRIDE has a Program Lead and a Program Coordinator. The Program Lead is a faculty member from the academic side. The Program Coordinator is a staff member from the student services side. Each of them serve as an instructor for the STRIDE. In year 1, they taught one section of 15 students collaboratively, and also handled the program aspects that extended outside of the classroom. In year 2, they each taught one section of 14-15 students (29 total), and also handled the program aspects that extended outside of the classroom.

Well before week 1, selected students received their acceptance letters, specifying requirements for reserving their spots. They were informed that they were preemptively registered for a section of the 1-credit STRIDE course, and that first-year academic advisors from the University (not inherently a part of STRIDE) helped with scheduling and associated modifications as needed. The acceptance letter also included anticipated benefits and commitments, such as:

- Participating in STRIDE sessions held once a week

- Reflecting once a month through an electronic journal guided by instructors
- Attending meetings for a professional group of your choice recommended by instructors
- Receiving training on peer mentoring for future STRIDE cohorts
- Demonstrating the use of recommended study methods weekly, for example, through display of out-of-class notes and Q&A with instructor on notes and weekly schedule.

It was also explicitly highlighted that there was no cost to students to participate in the program, and contact information for the instructors was shared.

Weeks 1 – 4 were used to help lay the foundation and establish expectations for STRIDE. In the first week, students were welcomed into STRIDE. Both instructors attended each other's sections for this first class. Students were tasked with scheduling their professors' office hours, and also clearing their schedule for the 3 –hour session that would occur in the following week. After the week 2 class, later that evening, STRIDE hosted a session featuring special guests, the Guaranteed 4.0 Program. Guaranteed 4.0 © is a proven system, combining learning methods with effective stress and time-management techniques. Students in the STRIDE course participated in this workshop to help them maximize their academic performance and overall success. The session was attended by STRIDE students, instructors, peer mentors, and other students who could benefit. In week 3, The STRIDE Peer Mentor and support network was formally introduced. And by Week 4, students were tasked with various assignments requiring them to demonstrate use of the recommended learning methods for weekly review. Instructors described growing interest by corporate sponsors, and the idea of hosting guest professional presenters & activity-leaders (PALS), who could lead activities as opposed to simply lecturing.

Weeks 5 – 8 consisted of checking in with students with regard to their impending or recently completed midterms, their study methods, and also facilitating connections with internal and external stakeholders. One example, was in Week 7, in which STRIDE's special invited guest was the Office of Student Financial Aid. Presentations and Q & A were facilitated on a range of topics including but not limited to: financial aid and financial literacy, location of the financial aid office; FAFSA (Free Application for Federal Student Aid) , federal work-study; possible actions in case financial aid doesn't all costs; outstanding documents; applying for scholarships; satisfactory academic progress (SAP); and Family Educational Rights and Privacy Act (FERPA). In Week 8, a focus was placed on professional development and resumes. A guest speaker from INROADS attended the STRIDE session. In addition to a very engaging talk on professional development, he shared a very comprehensive resume template, which can currently be found at <https://inroads.org/wp-content>. Students were given the assignment of submitting a copy of their resume. They were also connected with other outlets and opportunities for resume reviews.

In weeks 9 – 12, the main focus was still on checking in with students and their use of study and learning methods. There was also a site visit to an area company. A pop-quiz was administered to get students thinking about their final performance and relation to their current situation in classes. This Week 11 "Pop-quiz" should have been administered in Week 10 or earlier before the drop date, but luckily it didn't have negative results. The quiz asked students questions about their up-to-date performance in their best and worst classes, and presented them with hypothetical scenarios of grade distributions, requiring them to calculate pseudo GPAs. This was a relatively simple but useful task.



Weeks 13 – 15 were used to help students bring the semester to a strong close. Following the Thanksgiving recess in week 13, final incentives were awarded and distributed, in Week 14, to students who demonstrated the greatest use of STRIDE-recommended study methods, as quantified by a countable number of study pages generated throughout the semester. This incentive program was separate from the grading criteria and policy of the 1-credit course. Incentives were also awarded based on the counted number of quizzes and grades above 90 in all classes. Students were given university-dollars that could be used immediately at university facilities, i.e., for dining. Incentives were as high as \$150 and there were also \$50 and \$20 options for individual students and sub-teams, as grouped by Peer Mentor. In week 15, the STRIDE Study Blitz was the main focus. This was a mandatory 3-day, 9 am – 4 pm event in which an underused space on campus was reserved to have the entire cohort study, with meals and snacks also available. At least one instructor and/or Peer Mentor was there throughout the day. Students were able to step out to attend professor’s office hours, group meetings, tutoring sessions, etc. and then return. This created a great environment for studying before finals week.

**Results – early results, data, and discussion**

The impact of the STRIDE Program can be reflected in the value gained by students. The available data which corresponds with these experiences, is valuable, but it should be noted that the impact on/for students are much more than can be quantified with such numbers. Still data is shared in an effort to provide clear metrics related to the program, and test the hypothesis that the activities and approaches taken in the program will help with student performance (as measured by GPA) and in turn help with retention, and subsequently with graduation.

Note that it will not be until another semester before first-year retention rate can be determined. Still, data related to the experience is being analyzed and aggregate data on fall grades can be given in addition to fall-to-spring retention rates. Comparisons can also be made with the previous year. Table 2 shows a comparison of such data.

Table 2: Comparison of retention and success of students within the program: Engineering and Non-engineering

		Cohort 1 – Fall 2018 [14]			Cohort 2 – Fall 2019		
		Engineering	Non-Engineering	All	Engineering	Non-Engineering	All
1.	% of Courses Completed	87% ± 23%	89% ± 21%	88% ± 21%	N/a	N/a	N/a
2.	GPA	2.86 ±1.15	2.78 ±1.00	2.82 ±1.03	2.53 ±0.99	3.25 ±0.63	3.04 ±0.81
3.	Fall-to-Spring Retention Rate	100%	63%	80%	90%	100%	96 + %

While there were not very large differences in average GPAs for engineering vs. non-engineering students in Cohort 1, the non-engineering students in Cohort 2 appear to have performed better academically as quantified by GPA. In any case Cohort 2 has an average GPA that is higher than that of Cohort 1. Further, Cohort 2 has almost twice the number of students. This is one set of data points that suggest the approaches utilized in STRIDE are not only effective, but may even be improving in their execution. It should be noted that there could also be various reasons for these changes, and continuous improvement and revisiting of new data is recommended. A boost in overall average of Cohort 2 over Cohort 1 could have been as a result of a stronger incoming first year class. It could have also been due to the recent implementation of university-wide first year advising. In the year that Cohort 1 was in their first year, the university did not have its new First Year advising model. In Cohort 2's first year, the university did have it. Hence, this could have also contributed to the change. One method to account for this would be to normalize these GPAs against the average GPA of all first-year students. That way STRIDE efforts relative to university efforts and changes in demographics could be observed. It should also be noted that the STRIDE program had students from all ranks, and there was great performance by students from the highest and lowest academic ranks of students at the university. Additionally it should be noted that fall-to-fall first year retention rate for Cohort 1 as compared to similar students, was ~6% higher than their peers. Data will be collected on Cohort 2 in subsequent semesters. For now, Table 3 shows previously reported data from Cohort 1, with some comparison to initial Cohort 2 data.

Table 3: Comparison of retention and success of STRIDE students:  
Black and Latino

		Cohort 1 – Fall 2018 [14]		Cohort 2 – Fall 2019	
		Black/ African-American	Latino/ Hispanic	Black/ African-American	Latino/ Hispanic
1.	% of Courses Completed	86% ± 23%	92% ± 17%	N/a	N/a
2.	GPA	2.72 ± 1.01	3.01 ± 1.16	N/a	N/a
3.	Fall-to-Spring Retention Rate	90%	60%	95 + %	100%

For Cohort 1, Latino students on average, completed a higher percentage of credits and obtained higher GPAs, but their Fall-to-Spring Retention Rate was lower. This phenomenon seemed to violate the oversimplified approach that students with higher GPAs would be more likely to be retained. Note that Cohort 2 had average GPAs that were higher, and corresponding Fall-to-Spring Retention Rates that were also higher than Cohort I.

STRIDE, which was initiated as a pilot is growing into a better established program, aimed at enhancing students' retention and success. It should be noted external support for this program is anticipated to grow, so that more students can be included, and supported for longer periods of time if/as needed to ensure success, e.g., graduation. Companies and philanthropic organizations

that are interested, are interested in programs that can help students at risk of missing critical academic benchmarks; diverse pools of potential candidates including Black and Latino students. Companies' whose community investment and support also align with their education tenets and talent recruitment initiatives may also get involved. Additionally philanthropic groups interested in being a part of successful initiatives may choose to support through approved grant proposals and related efforts. External sponsorship in addition to internal support through the Provost's office is being pursued to help grow the program.

The STRIDE program has utilized a synergetic mixture of cohort-based approaches, role models, innovative 1st -year curriculum, enhanced advising, promotion of excellence and GPAs, peer mentorship, learning techniques, and now scholarships accessible as early as the second semester. Success can be correlated with the program based on aggregate performance of students. Further anecdotal feedback from the students themselves suggest the program has been successful. With the continued implementation and believed improvement of the program, longitudinal data collected may help reveal the answers to research questions that help inform how retention and success may be improved in general. It is anticipated that follow-up studies with such data might highlight just what aspects of the STRIDE Program impact students' retention through sophomore year, and ultimate graduation years later. The research question that might be addressed is: 1. How do curricular elements of a first year Cohort program impact retention of students through sophomore year and graduation? For now, while more detailed mapping of STRIDE activities to student performance and retention could be interesting, collection of aggregate performance data and reporting of Cohort activities is more practical, and useful at this stage. It is also helpful to try and identify if there are differences in the impact on students from different disciplines. The present paper focuses on the impact on engineering students versus that on non-engineering students.

## **CONCLUSIONS**

The engineering students in Cohort 2 of STRIDE – a First-Year Program of mostly non-engineering students – did not perform as well as non-engineering students with regard to GPA. There were not any specific activities that were done in STRIDE that catered to engineering students, but one of the instructors was an engineer. In Cohort 1, small differences were noticed in engineering student performance and it was believed that it could have had something to do with the lead instructor being an engineering professor. Support of first year engineering students is still important. The concept of supporting engineering students through cohort programs of mostly non-engineering students, or alternatively even dedicating support to a cohort of engineering students is still being considered. In any case, average GPA for the STRIDE Cohort is at about a 3.0 – an increase from the previous year, and engineering students aggregate performance is just above a 2.5. Data is still being collected and processed to determine percentage of credits completed in the first semester, and first-year retention requires another full semester before it can be determined. Tentative plans for the STRIDE program are to continue to grow. While the university continues to support the efforts of STRIDE, corporate sponsorship has been pursued in both years of the program. Efforts are being made to grow funding and partnerships. Tentatively, the STRIDE Program may seek to increase the number of students, and/ or expand focus and support efforts on developing follow-up sophomore and junior level versions of the program to help ensure success of our students through graduation. These ideas

may compete for resources. If a first year program is enough in of itself, then no need to extend the number of years that a Cohort of students are actively engaged in the program. Focus can instead be put on impacting a larger number of incoming students. Ultimately, doing some combination of booth seems like it will have the best impact.

## REFERENCES

- [1] T. P. Scott, H. Tolson, and T.-Y. Huang, "Predicting Retention of Mathematics and Science Majors at a Research One Institution and Suggested Advising Tools," *Journal of College Admission*, vol. 204, pp. 20-24, 2009.
- [2] J. L. Zheng, K. P. Saunders, I. Shelley, C. Mack, and D. F. Whalen, "Predictors of academic success for freshmen residence hall students," *Journal of College Student Development*, vol. 43, no. 2, p. 267, 2002.
- [3] R. Thompson and G. Bolin, "Indicators of Success in STEM Majors: A Cohort Study," *Journal of College Admission*, vol. 212, pp. 18-24, 2011.
- [4] M. J. Chang, J. Sharkness, S. Hurtado, and C. B. Newman, "What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups," *Journal of Research in Science Teaching*, vol. 51, no. 5, pp. 555-580, 2014.
- [5] P. R. Backer and C. Kato, "Effect of cohorts on student retention in engineering," in *2017 ASEE Annual Conference and Proceedings*, 2017, pp. 25-28.
- [6] V. Perzmadian and M. Credé, "Do first-year seminars improve college grades and retention? A quantitative review of their overall effectiveness and an examination of moderators of effectiveness," *Review of Educational Research*, vol. 86, no. 1, pp. 277-316, 2016.
- [7] T. L. Strayhorn, L. Long III, J. A. Kitchen, M. S. Williams, and M. E. Stenz, "Academic and social barriers to Black and Latino male collegians' success in engineering and related STEM fields," 2013.
- [8] L. Long III, T. S. Henderson, and M. Steven, "Institutional Barriers to Black and Latino Male Collegians' Success in Engineering and Related STEM Fields," 2018.
- [9] L. L. Long III, J. A. Kitchen, and T. S. Henderson, "Black Male" Buoyant Believers" in Engineering and Engineering-Related Fields," 2015.
- [10] V. Tinto, *Leaving college: Rethinking the causes and cures of student attrition*. ERIC, 1987.
- [11] C. Adelman, "Answers in the Tool Box. Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment," 1999.
- [12] T. L. Strayhorn, "When race and gender collide: Social and cultural capital's influence on the academic achievement of African American and Latino males," *The Review of Higher Education*, vol. 33, no. 3, pp. 307-332, 2010.
- [13] S. Gershenfeld, D. Ward Hood, and M. Zhan, "The role of first-semester GPA in predicting graduation rates of underrepresented students," *Journal of College Student Retention: Research, Theory & Practice*, vol. 17, no. 4, pp. 469-488, 2016.
- [14] K. Wright, "Freshman-year Initiative for a Cohort of Largely Engineering Minority Students," presented at the 2019 ASEE Annual Conference & Exposition, Tampa, Florida, 2019. Available: <https://peer.asee.org/32860>