Nourishing STEM Student Success

via a TEAM-Based Advisement Model

Bernard A. Polnariev[1], Reem Jaafar[2], Tonya Hendrix[3], Holly Porter Morgan[3],

Praveen Khethavath[2] & Abderrazak Belkharraz Idrissi[2]

[1] Dean of Curriculum, Accreditation, and American Honors, Union County College, Cranford, NJ, U.S.A.

[2] Department of Mathematics, Engineering, and Computer Science, LaGuardia Community College, Long Island City, New York, U.S.A.

[3] Department of Natural Science, LaGuardia Community College, Long Island City, New York, U.S.A.

Correspondence: Bernard A. Polnariev, Dean of Curriculum, Accreditation, and American Honors, Union County College, Cranford, NJ, 07016, U.S.A.

Abstract

LaGuardia Community College is an international leader recognized for developing and successfully implementing initiatives and educating underserved diverse students. LaGuardia's STEM students are holistically advised by a team of dedicated faculty and staff members from different departments and divisions. As an innovative approach to advisement, students are first connected to an advising team member in their discipline-based first-year seminar and consequently guided by other cross-institutional advisement team members to ensure their continued success. In this article, we share our policies, processes, and promising practices in advising STEM student at an urban public institution. We present arguments that address and support five pillars for student success: 1) the student matters, 2) supportive culture matters, 3) effective communication matters, 4) data matters, and, 5) clear pathways and effective advisement matters. Finally, we present empirical evidence that show positive results in terms of students' retention. Specifically, there was an improvement in the actual Fall 2015 to 2016 return rate of STEM students, from 62.9% to 64.6%. Our scaled practice demonstrates the value of collaborative team-based advisement efforts as supported through professional development can improve community college STEM student persistence when the above five pillars are fully espoused by the institution.

Keywords: Advisement, Academic affairs and student affairs collaboration, STEM advisement

1. Introduction

1.1 Our College's Challenge

LaGuardia Community College's faculty and staff members work assiduously to support student success under the College's ambitious motto, "Dare to do More." As part of the City University of New York (CUNY) system, we educate nearly 20,000 credit students through over 50 degree and certificate programs. The College is located in Queens, New York's most ethnically diverse borough. Correspondingly, LaGuardia is often referred to as the 'world's community college'. Our students hail from nearly 150 countries and speak 100 languages. Forty-two percent of students are above the age of twenty-two, and are employed (either part-time or full-time). The College's students' needs are as distinctive as the student body. Over three-fourths of our students have an annual family income of under $25,000 (LaGuardia Community College Institutional Profile, 2016). Comparable to many similar institutions, LaGuardia's students are largely underprepared for college-level work; for example, in the 2015-2016 academic year, a staggering 73% of incoming freshman needed at least one remedial mathematics course (ibid).

To address these challenges and improve key metrics of student success, especially graduation rates, the college partnered with Achieving the Dream (ATD) to identify weak points in our advising structure and barriers to our students' success. With their support, we realized that communication was 'fragmented,' especially between employees from the Academic Affairs and Student Affairs divisions. This communication gap negatively impacted the students. With this knowledge, LaGuardia decided to transform their advisement model in 2012, launching a redesigned advisement model predicated on a cross-divisional and cross-programmatic collaboration.

Team based advisement approaches have been used in a variety of colleges and are supported by a growing body of research (e.g., O'Banion, 1994; Petress, 1996; Deil-Amen, 2011). LaGuardia's team-based advisement model is grounded in a unique design, especially for a community college. It was established to create a comprehensive and holistic advising system through increasing employee cohesion and communication, which ultimately would, in turn, boost student success outcomes. LaGuardia's advisement infrastructure was intentionally constructed, with broad faculty and staff input to address the myriad of issues that plague similar students across the nation. In order to redesign advisement, the College's President and her Executive Council members charged a team to, in part, design a student-centered advising system that would:

1) be team-based (across many divisions and departments), and

2) engage an "Advising by Major" approach as supported through professional development.

1.2 Exploration of Research

Community college leaders have made advances in acknowledging policies and practices that are in need of enhancement and are becoming progressively more capable of utilizing research and assessment efforts (Brock, Mayer, & Rutschow, 2016). Researchers and practitioners have long recognized that effective academic advisement is an institutional linchpin for student success, supporting both learning, retention, and graduation (Zhang, 2015). Since academic advising is intimately connected to student's educational experiences – from program of study to general education to experiential learning – advisors have the opportunity to help students connect diverse learning experiences (White & Schulenberg, 2012). Advisement buttresses community college students' achievement (Bahr, 2008). However, advisement must be timely, targeted, and consistent. Community colleges have a pivotal role in helping students to obtain a Science, Technology, Engineering, and Mathematics (STEM) education that leads to promising career prospects, both by preparing students for further STEM education at the Bachelor's degree levels and by preparing students for STEM jobs that require an Associate's degree or certificate (Grant, 2016).

The role that faculty members play in advising STEM students on job and career paths related to their majors is indispensable, especially when coupled with support from professional academic advisors (Jackson & Laanan, 2011). Students stated that having "multiple advisors fostered confidence and motivation to continue their pursuit of STEM fields" (Packard & Jeffers, 2013, p. 73). While a team-based advisement approach potentially brings a superior level of support and opportunity to students, it also presents novel challenges for both the "team members" and the students. Specifically, coordination of efforts, including communication between all involved team members, is a primary challenge. Quality advisement depends on competent and clear communication between all stakeholders (Harrison, 2009 as cited by Zhang, 2015). Although advising has a direct impact on students' success and development (Hue & Hutson, 2016), its assessment mechanism is not straightforward. Hue and Hutson (2016) proposed an appreciative advising framework that moves away from simply fixing problems to one that uses reflection and positive interactions. Similarly, the assessment of our model is not straightforward, but we present initial evidence of its success.

STEM fields have become increasingly central to the American economic growth (U.S. Department of Labor, 2007). According to the National Economic Council and Office of Science and Technology Policy, "jobs of the future are STEM jobs" (N.A., 2015, p. 24). However, fewer than 15% of community college students across the nation earn an Associate's degree in a STEM field (Packard & Jeffers, 2013). LaGuardia has emphasized the value of a STEM degree, boosting the number of overall students studying in one of these majors from 15% in 2012 to 21% in 2015. Although the College has advanced numerous programs and has achieved-a-higher-than-average graduation rate as compared to the national averages, the rate remains unacceptably low. The one-year retention rate of full-time first-time fall 2014 entrants was 64%, representing a 2.1 percentage *decrease* as compared to the prior year (CUNY Performance Management Process, 2016, p. 16). However, the 2012 overall College cohort (of full-time first-time freshmen), had a 3-year graduation rate of 20%, which is 3.7 percentage points *higher* than the prior cohort; although this is a promising increase in completion rates, it remains far from satisfactory (ibid, p. 24).

1.3 Our Resolve: A Team-based Advisement Model

Our case study aims to address whether we could develop and evaluate the value-added of a scaled team-based advisement model. Members of the Provost's Cabinet developed a plan for full implementation by Fall 2013. The College believes that collaboration is paramount to fully engage and support our students. Furthermore, to best serve our students, we require the expertise of many dedicated partners, who collectively are always available to help. The structure of the advisement teams was formed to maximize the social and cultural capital of our faculty based on the wide array of student needs. Every advisement team member plays a critical role in supporting student success. The

objective of this research is to holistically assess our advising system for STEM students and its impact on boosting student success outcomes, measured partially through retention rates.

We believe that our holistic approach to advising will improve STEM retention rates. Our team evaluated the five pillars of our advisement model: the student, supportive culture, effective communication, data, and clear pathways. With a dearth of qualified college graduates, community colleges play a vital role in preparing students for success in the STEM fields through both workforce and transfer programs (Packard & Jeffers, 2013). LaGuardia is steadfast in improving STEM success. To fulfill this imperative, we must more efficiently engage STEM students with affiliated faculty and advisors in a variety of collaborative and cooperative ways to build upon their learning, skills, and knowledge. LaGuardia has promised to bolster retention and completion with several revised academic support structures for all STEM students, especially grounded in a transformed advisement approach. The College has seven STEM programs across two academic departments: 1) Mathematics, Engineering, & Computer Science (MEC), and 2) Natural Sciences (NS). In addition, our Liberal Arts: Mathematics & Science program does not belong to a specific department per se; rather, it is an interdisciplinary program across both of the previously mentioned departments and largely supported through the Provost's Office to ensure effective coordination. Collectively, the revised College infrastructure and strategy has led to the creation of the LaGuardia's STEM advisement team, the STEM First-Year Seminars (FYS), and the expansion of experiential learning opportunities available to STEM students. The STEM advisement team is co-chaired by a STEM faculty member and a STEM advisor from Student Affairs, who collaborate closely with all 75+ dedicated team members to improve student success. The division for Student Affairs includes various areas including the Offices of: Admissions, Advisement, Athletics, Campus Life, Enrollment, Financial Aid, Health and Wellness, Registrar and Transfer Services. This partnership between LaGuardia's Academic- and Student Affairs is a crucial component in ensuring that students have comprehensive support. The co-chairs of this team disseminate advisement information to team members through regular meetings with program directors for the STEM majors and work with these leaders to organize college-wide STEM advising events. In addition to the numerous faculty members and professional advisors who are integral to the advisement team, every team is also composed of counselors/staff from various centers, including: Health and Wellness, Financial Aid, Admissions, Career, and Transfer, as well as Peer Success mentors (Refer to Figure 1 for an illustration). In addition, every advisement team receives support from department chairpersons and a senior college administrator who serves as a team "coach." In this paper, we describe LaGuardia's pioneering and collaborative approach to advising community college STEM students. Insert Figure 1.
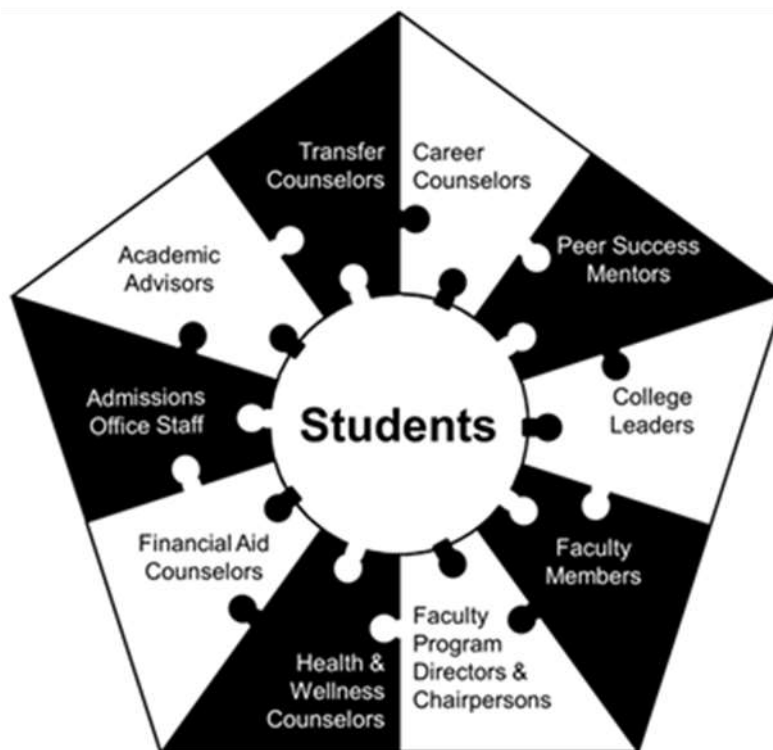

Figure 1. LaGuardia's STEM team-based advisement model.

For the past five years, the College's Strategic Plan has explicitly highlighted "strengthening advisement" as the first (of five) institutional focus areas. Annually, every college division, as well as every academic department, is required to make progress on advancing and assessing student success via advisement efforts. For example, LaGuardia's Strategic Plan called for the continued advancement of advisement (LaGuardia Community College 2016-17 Strategic Plan 2017):

Strengthen advising through various initiatives including professional development for faculty, staff, and peer advisors to support student success and establish and address key advisement benchmarks according to advising plan. (LaGuardia's 2016-17 Strategic Plan, Target C1a).

LaGuardia engages in several high-impact community college practices. Specifically, and as a critical component of our advisement model, we launched three discipline-based FYS for STEM students, linking an introduction to the College coupled with a primer to the specific discipline and engagement with the linked faculty members (Bryant, 2015). There is, however, a lack of alignment between the attitudes, behaviors, and expectations of college freshmen and the rigor of higher education (Arum & Roksa, 2011). Students come to college with ample ambitions, though often have limited knowledge of and a lack of direction about career paths and occupational expectations. Our STEM FYS curricula is infused with other high-impact practices, including: the use of electronic portfolios (i.e., *ePortfolio*) and reflections, the use of writing as a means of thinking and communicating, the application of collaborative assignments, and the common intellectual experiences for students (Moore, 2016). Lowenstein (2015) stresses the importance for students to create and maintain an ePortfolio throughout their academic career in order to set and track their academic goals. By following these best practices, our FYS has become essential in helping STEM students better understand the stringent requirements and resources available for their success.

2. Method

The approach of this case study is the qualitative method called action research (Lingard, Albert & Levinson 2008). Action research is best described as a reflective, collaborative process that designs a system to solve a problem (Checkland, 2011); by necessity, the researchers take part in the design, implementation and evaluation of the solution. The Checkland (2011) model of action research was used to systematically design, implement, and evaluate our team-based advising model. This model has three aspects: the framework, the methodology, and the area of concern. As described above, the area of concern is improving student success, particularly the success of students in the STEM areas by remediating a lack of collaboration between the college's Student Affairs and Academic Affairs divisions. Our operational framework consisted of providing excellent advising to our students that required the cooperation of not only faculty and professional advisors, but also required the deliberate involvement of most of the college. In this section, after describing the impetus for developing team-based advising, we describe our methodology by overlaying our work on to five themes of large-scale institutional change.

The College carefully audited its previous advisement model in order to revamp it (Bryant, 2015). We consequently identified five pillars to help us develop and implement an improved advisement model that bolsters STEM student success. Given the typical institutional silos and cultural behavior of many STEM faculty, Kezar and her colleagues emphasize that meaningful change occurs at the departmental level, rather than the institutional level (Kezar, Gehrke, & Elrod, 2015). Thus, cross-departmental and cross-divisional collaboration was essential for LaGuardia to make any significant system-level improvements in key student success metrics. Effective advisement is critical to institutional reform (Bailey, Jaggars, & Jenkins, 2015). In their recent book, Felten and his collaborators highlighted that:

When LaGuardia undertook massive organizational change to more seamlessly connect academic affairs and student life to better advise students, the leadership team received input from more than 400 faculty and 150 staff and supported 20 people to work together to research practices at other institutions. The new advising model at LaGuardia created teams of faculty and staff…. Faculty, staff, and students valued both the engaging process and the new structure that emerged to meet an important institutional goal (Felten, Gardner, Schroeder, Lambert, Barefoot, & Hrabowski, 2016, p. 139).

Collaboration is essential for any substantial organizational reform; faculty should genuinely partner with others within and across departments and divisions to systematically foster student success outcomes (Jenkins, 2014; Polnariev, Levy, & McGowan, 2010). Moreover, academic advisement is an optimal bridge, connecting Academic- and Student Affairs divisions (Levy & Polnariev, 2016). Collaboration is a central component for genuine alignment between divisions and/or departments; it is critical to decreasing the conventional hurdles that stand between our organizational structures. Through "cross-functional collaboration to forge educational partnerships, especially between Academic and Student Affairs, we can ensure that both student learning and the overall undergraduate

experience are not only effective but also ...transformational" (Felten, et al. 2016, p. 111). Unfortunately, collaboration between faculty and Student Affairs staff remains relatively scarce at many colleges (Banta & Kuh, 1998); they typically function territorially rather than collaboratively (Kezar, 2003). Based on an extensive review of student success practices grounded in empirical research and executed by ATD institutions within college settings, five themes worth bringing to the foreground, as they both align with our views of student success and helped us conceptually structure this article (see Harrill, Lawton, & Fabianke, 2015), include the following:

1)   The student matters. These colleges supported the whole student, addressing academic, social, health, and financial obstacles to support student success, including the completion of a postsecondary credential (Kuh, Kinzie, Schuh, & Whitt, 2011).

2)   Supportive culture matters. Building an environment that inspires and supports faculty and staff to collaboratively generate solutions and spearhead the changes bolsters student success. The most productive and sustainable student success initiatives are frequently those that are driven by faculty and staff (Johnson, Adams, Becker, Estrada, & Freeman, 2015).

3)   Effective communication matters. These institutions appreciated the value and power of effectual and regular communication. Faculty and staff fashion and use every opportunity possible to tell their college's story, as well as the stories of their students to engage, and produce buy-in, and also to motivate other campus leaders (Bryant, 2015).

4)   Data matters. These schools created a culture of evidence and inquiry that pervades the institution and its constituents. These colleges continuously reviewed the students' experiences, progression, and outcomes, and these analyses inform the creation, implementation, and evaluation of their strategy to enhance the student experience and increase outcomes (Hora, Bouwma-Gearhart, & Park, 2017).

5)   Clear pathways and effective advisement matters. These colleges worked diligently to develop clear and attainable graduation pathways. These paths included preparation for higher education, academic advisement, career advisement, college completion, the labor force and/or further education (Jenkins, 2014).

Efficacious application of these "matters" breaks down silos between departments and divisions - improving institutional culture and helping students thrive. These themes constitute our methods for holistically assessing our approach to advising. Below are illustrative examples of how we have embraced and buttressed these pillars noted above, which in turn have allowed us to advance sustained student success – daring to do more.

2.1 The Student Matters

Proactive developmental academic advising is an approach concerning the "whole student;" the complexity of the activity and its pedagogical potential continues to be largely overlooked by most institutional constituents (Drake, Jordan, & Miller, 2013). Furthermore, proactive "academic advising is student-centered. Developmental advisors teach students how to think differently…, [they] respect student's thinking, and prior knowledge" (Reynolds, 2013 as cited by McGill, 2016, p. 52-53). Every semester, team leaders coordinate a variety of STEM advisement-based events dedicated to supporting the students, including both general advisement and co-curricular events. The central attribute of these events is connecting STEM students with each other, with advisement team members, and helping them not only understand their program of study and its requirements, but moreover, to become aware of the many institutional resources available to them. Therefore, not only are advisors available at these events to assist with course selection, faculty attend to discuss research and internship opportunities, while other team members representing offices including Financial Aid and the Wellness Center are invited to assist with relevant questions. General advisement events occur each semester and are typically held over a three-day period.

Another essential component of the College's new advisement model is the redesigned FYS taught by faculty in the specific major. There are three different STEM-based required FYS: one for Engineering and Computer Science programs (0 credits); one for Biology and Environmental Science majors (2 credits); and one for our Liberal Arts: Mathematics & Science majors (3 credits). Note that differences in credits awarded for these FYS reflects credit availability within the curriculum, and thus the in-class time. These STEM FYS courses help students develop a STEM identity and begin to enrich their social capital; STEM competencies are vital for "cognitive human capital" (Carnevale, Smith, & Melton, 2011, p. 9). The instructional objectives of the STEM FYS include introducing students to relevant habits of mind, familiarizing students with ethics and values, enhancing their communication skills, supporting new students' transition to college, and connecting them with faculty, staff, and peers from the related discipline. Students also learn the key support resources related to student life and engage in using these resources to advance academic success. To this end, FYS faculty regularly host members of the STEM advising team in their classrooms; team member visits to FYS courses support the student by addressing various questions and

concerns connected to specific areas of expertise. In this manner, manifold areas of the College come together in the FYS, working with students to ensure their success. Faculty also guide them in setting goals, exploring educational and career options, and developing an individualized "graduation plan." However, this plan requires continuous follow-up and feedback from the STEM team. The FYS benefits from oversight provided by the chairpersons of both MEC and NS departments.

2.2 A Supportive Culture Matters

STEM advisement teams meet regularly; new team members are strongly encouraged to receive advisement training provided by more senior faculty and staff vis-à-vis the Center for Teaching and Learning [CTL]. Specifically, they can take the "Foundations of Advising" seminar to learn about the College's advisement model and the resources available to guide students. For faculty who also decide to teach a FYS course, they are required to take a year-long "New to College" seminar, which is deeply grounded in various components of advisement. Within the STEM unit, there are faculty groups who design and share sample assignments for the specific FYS courses.

With significant support from a five-year, multi-million-dollar, Title V grant from the US Department of Education, Project "AVANZAR" was developed to strengthen LaGuardia's STEM advisement. Under "AVANZAR," the CTL put forward the "STEM Advisement Seminar," series that was co-led by two STEM faculty members. In the first two years of this seminar, over three-dozen faculty and staff have participated in the series of workshops. Through an inquiry-based and integrative approach, this professional development seminar was designed to better prepare faculty in guiding STEM students in their academic studies. This seminar allowed faculty members to practice techniques for advising STEM students, both inside and outside of their classrooms, through role-playing, training via online advising tools, and creating an advising syllabus. This advisement seminar has been instrumental in creating a space for STEM advising team members to learn together, discuss approaches relevant to STEM students, and collaborate on advisement plans.

2.3 Communication Matters

One of the most important, though generally underappreciated facets of fostering student success is engaging in clear, timely, and frequent multidirectional communication with all constituents. With LaGuardia's advisement model, via email and face-to-face communication, the coach regularly provided the team leaders with key programmatic, policy, and institutional updates, which they in turn disseminated to the rest of the team. Reciprocally, the team leaders sent the coach progress reports that were consequently shared with other coaches (from the other advisement teams), as well as the senior institutional leaders–a continuous, bi-directional flow of information. Coaches met every few weeks and keep the College President, Provost, and Vice President for Student Affairs aware the team progress as well as the many challenges of guiding thousands of students through such a complex system. Team leaders coordinated monthly meetings with as many advisement team members as possible. Over time, as trust and credibility was established, faculty and staff from the various areas forged relationships. These connections were key for the STEM team, whereby members felt supported and, in turn, comfortable calling one another with various questions. Communication helped build a stronger and more informed community to support our STEM students.

Given what we learned from some of the best practices from other advisement teams coupled with the maturation of the STEM team over the past several years, member credibility, relationships, and the flow of communication enhanced. As a noteworthy example, professional advisors from the Student Affairs division were invited to the monthly academic department meetings. One advisor regularly participated in the NS department meetings, and another attended a portion of MEC department meetings as needed. STEM faculty members became more familiar with the designated STEM advisors, which helped further strengthen the STEM advisement team. This connection ultimately affords better communication and student support, which exemplified a cultural shift in belief and practice. Since then, Student Affairs leaders have invited faculty program directors from the STEM majors to speak to the entire professional advisement troupe (of nearly two dozen advisors) as a pilot initiative titled, "411 Info Sessions." At this venue, the STEM program directors discussed general course requirements and elective recommendations, developmental course issues, transfer suggestions based on articulations, and career paths.

2.4 Data Matters

Nationally, STEM fields faced distinctive retention challenges, with the highest levels of attrition rates as compared to the other disciplines (Carpi, Ronan, Falconer, Boyd, & Lents, 2013). Notably, they emphasized that although the students who attend these colleges are typically those who are most in need of support, they are the ones least likely to receive it due to institutional underfunding (ibid). Obtaining and utilizing retention and other outcomes data in support of the advisement model can be quite challenging. We provide retention rates in the results section.

Members of the advisement teams implement several events based on the discussed retention data to improve STEM student retention for example. One of the most popular events in STEM engagement efforts is "Pi Day," held annually circa March 14th (i.e., 3.14). It is a co-curricular event that brings students, staff, and faculty together from many departments. The event helps illustrate how math is central to much of our world. In 2016, LaGuardia celebrated their fifth anniversary of *Pi Day* – with the largest group of students (n = 150+) ever attending. This event was also the first time that we brought advisors in to ensure that students were either taking, or on-track to take, the correct math course for their specific major. Students who complete requisite math problems and other activities earn a ticket for an immediate slice of the pizza pie, which is a powerful motivator (Ariely, 2016).

In addition, our annual *STEM-Wide Career Panel & Networking Day* was very successful. Coordinated by faculty and staff from the STEM Advising Team, this event featured a group of enthusiastic panelists from a variety of STEM disciplines who share information about their careers, answer student questions, and describe their workdays. The 2016 panel for example, was attended by 200+ students; it featured engineers, medical doctors, a biochemist, and a climatologist; the event organizers were careful to include women and minorities on the panel.

2.5 Clear Pathways and Affect Advisement Matters

With over 50 degrees and certificates, an essential tool that both students and advisement team members used was a recommended curricular sequence that was put forward by faculty program directors. The curriculum was developed in consult with faculty teams, approved through a multi-layered governance process, grounded in evidence, and reviewed by the academic dean before it is approved by the CUNY Board of Trustees and then New York State Department of Education. In the age of "guided-pathways" in higher education, it is imperative to condense curricular offerings into a set of focused groupings where possible, especially for those students who are academically underprepared (Bailey, Jaggars, & Jenkins, 2015).

College websites hardly ever clearly chart program pathways for students (Bailey, et al., 2015). Collaborating with faculty program directors, chairpersons, and the Office for Academic Affairs, our colleagues from Institutional Advancement transformed LaGuardia's academic website. The layout is significantly more user-friendly and interactive–every program webpage has uniform elements, including: a tab for the recommended course sequence within the curriculum, career trajectories with salary and job statistics, transfer opportunities, and advisement team membership with contact information. All academic programs are reviewed and assessed every five to seven years. Curricular updates based on programmatic learning goals and industry needs are made regularly in order to best serve the students (see Arcario, Eynon, Klages, & Polnariev, 2013). It is, however, through dialogue with the advisement team members (beginning with FYS), that students can better understand course sequences, and how the courses connect. For those students who are still exploring their interests and options, advisement team members smoothly refer students to team members from other disciplines to help guide them. Advisement affords an integrated view of the curriculum, helping them make meaning of their curriculum, and aiding them in synthesizing the logic of course sequencing.

3. Results

In this case study, our focus was to develop, implement, and evaluate the value – especially on persistence, of a new team-based advisement model for our STEM students. The methods section describes in detail the system that was put in place, as well as the institutional changes that supported and were necessary for its implementation; this section reports the data collected to evaluate our efforts. Our Fall 2016 STEM Advising Outcomes Scorecard is shown in Figure 2. Although possibly dizzying at first glance, this diagram beautifully provides a snapshot of STEM advisement outcomes. Part A (of Figure 2) indicates that 74% of all STEM majors who enrolled in Spring 2016 (n = 3277), had returned the following fall semester and/or graduated (i.e., 26% did not return or graduate). There was a slight retention improvement for Fall 2016, from 72% in Fall 2015 (based on the thin white line, which compares the rates against the same one-semester return rate). The vertical lines compare STEM students against all LaGuardia's students. Based on these outcomes, STEM students ranked slightly below the College's average of 76%. Part B shows the progress towards a STEM degree (on average), using three key measures: 1) percentage of students with a GPA higher than 2.0, 2) percentage of students who are full-time, and 3) those who passed all of their courses. The graph indicates that on average, 66% of STEM students passed the three threshold measures by the end of Spring 2016. Part C displays that the one-year retention rate for new STEM students from Fall 2015 to Fall 2016, is 64%, which is higher than the College average of 62%, and higher than the previous Fall (see the thin white line: 58%). Part D reveals that the one-year graduation rate for those students who earned at least 45 credits by the beginning of Fall 2015 is 51%; this rate is below the College average of 60%, and slightly below the average when compared with Fall 2014 STEM majors' one-year retention rate (i.e., 52%).

Table 1. Fall 2014 to Fall 2016 Retention Rates

Advisement Teams	Fall 2015 Enrollment	Fall 2014 to Fall 2015 Retention	Fall 2015 to Fall 2016 Retention
1. All advisement teams (averaged)	15,504	64.3%	66.6%
2. All STEM teams (averaged)	3315	62.9%	64.6%

Table 1 compares retention rates for two consecutive years for STEM teams and all the teams. From the overall 15,935 Fall 2014 degree-seeking students, the return/ graduation rate was 64.3% compared with 66.6% for the new Fall 2015 cohort. Although STEM students performed slightly below the college average for both entering groups, there was an improvement in the actual Fall 2015 to 2016 return rate of STEM students, from 62.9% to 64.6%. Note that in Fall 2015, the three STEM-related FYS became a requirement for these majors. Although we cannot directly connect this improvement to the seminar, we are confident that the seminar contributed, in part, to our improved retention rates for STEM students.

3.1 The STEM Scorecard

The scorecard is intended to measure progress towards our goals, regardless of the characteristics of the entering class. Team advising is a project that attempts to move responsibility for meeting the larger graduation goal set from the Executive Council to the faculty and staff associated with students in majors. Meeting these goals requires that the advising teams influence retention to graduation of all students, not just students in boutique programs. Thus, these measures are necessary because they combine to show the progress of all students, across all majors. Each year, more new students must be retained, more students must come back after two semesters and more students with 45+ credits must graduate.

3.2 Challenges to STEM Advisement

Despite the progress that the STEM advisement team has made in helping nourish the success of our students, there remains much work ahead of us. Although many of these challenges are indeed commonplace across many institutions, they continue to hinder our momentum for improvement. Nevertheless, the more cohesively that our STEM team collaborates to better serve our students, the greater gains we will see in outcomes. The following issues are ones that we are working together to remedy.

3.2.1 Turnover

When key leaders from the group leave, there is often an initial sense of vulnerability, despair, and a sense of disorientation. In our case, we have had four staff team co-leaders leave. We were certainly fortunate to have continuity with our faculty co-leader for the past four years, she is essential to reassuring our members of the goals and plans that we have established. With support from the Provost, we are able to secure funding resources in the form of release time to allow the faculty team leader time to dedicate to this function, thus reducing possible turnover.
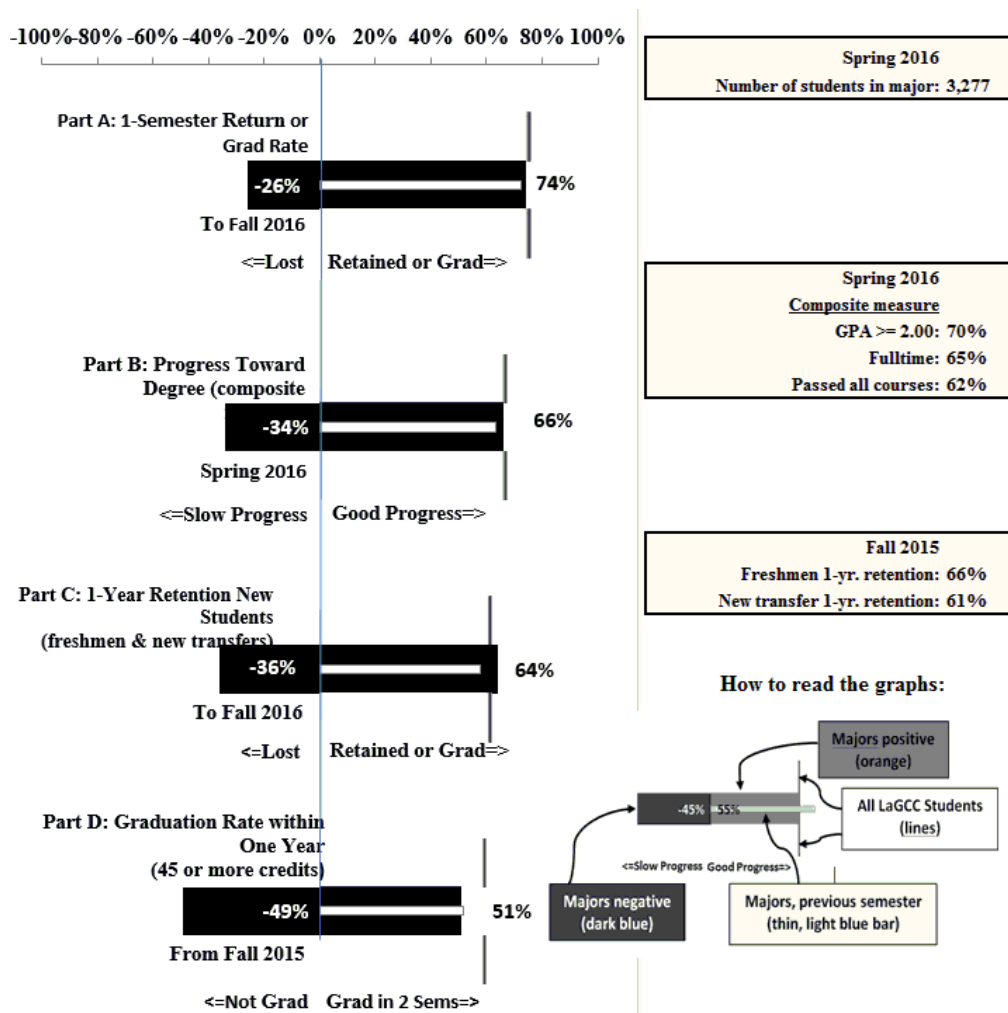
Figure 2. STEM Advising Outcomes Scorecard for Fall 2016 (All STEM programs).

3.2.2 Communication

Frequent and clear communication often becomes burdensome and consequently lessens over time. Team members can easily get overwhelmed with emails and meetings; they also often become desensitized to and, in turn, ignore some emails. While it is crucial to have frequent emails free flowing, it's also important to be conscious of the amount of communication, prioritizing what is shared, and when; timing of information is imperative.

3.2.3 Funding

The College and its constituents were fortunate that we have funding to implement such a complex advisement model. The College secured many grants and repurposed existing funds to effectively execute our redesigned advisement (and FYS) model. The College prioritized advisement as evident in the major investments of staff and resources.

3.2.4 Getting 'All On-Board'

While all staff, including peers were hired to advise students, faculty were not; faculty were not explicitly required to advise according to our union contract. Moreover, not all faculty members felt comfortable and prepared advising students. We found that two key components worked together to move faculty toward a finer understanding of their crucial role in advising STEM students: professional development and the team model. LaGuardia's CTL provided support via professional development that allowed faculty to learn new skills and gather tools used in advising. Even more important in getting our faculty prepared and willing to effectively join the STEM advising team is knowing that other team members (with possibly more experience and knowledge in advisement), are omnipresent to assist

when needed (see Levy & Polnariev, 2016). Many faculty were also motivated to advise because it was a major institutional activity, with full support from academic chairpersons, the Provost and the President.

3.3 Successful STEM Students' Stories

Not only do our dedicated faculty and staff "dare to do more," but so do our LaGuardia students. With support from various grants and as part of their curriculum, students often collaborate with their professors on research projects inside and outside the classroom. Below are a few of the many STEM success examples that demonstrate our work, and further inspire us to continue advising students.

Gobinda was advised by his faculty team to engage in experiential learning. Along with several Computer Science faculty members, they published and presented their research work on the "Secure and Privacy Preserving Mobile Healthcare Data Exchange using Cloud Service" project (Pal, Senchury, & Khethavath, 2016). While earning his associate degree, he was an honors society member and a math tutor for the Accelerated Studies in Associate Programs (ASAP). Gobinda graduated from LaGuardia in 2016, and has transferred to Stony Brook University for his bachelor's degree in Computer Science.

Isabel is an Environmental Science graduate. She was advised to conduct research with a professor before completing her associate degree. Working on a research project gave her hands-on experience in the field of choice and helped ensure that she was indeed in the "correct" major. She spent two years working with her mentor at a highly polluted waterway collecting water samples and testing them for heavy metals. Isabel presented papers and posters at numerous conferences. After graduating from LaGuardia, she was accepted to the Queens College Transfer Honors Program in Environmental Science and has completed both her bachelor's and master's degrees.

Gerardo was a student facing socioeconomic obstacles during his academic journey for a higher education. As encouraged, he was accepted to the biology research team and began work on multiple research projects. Gerardo conducted research at LaGuardia and also at the Wessel Lab at Brown University. After working with his faculty advisor for nearly two years, Gerardo coauthored a publication in 2016. After graduating LaGuardia, Gerardo transferred to the College of Mount Saint Vincent where he will complete his bachelor's degree in Biology. His journey highlights the fruits of collaboration between faculty and staff in advising students about learning opportunities.

4. Discussion

Retaining and graduating STEM students remains a significant challenge at LaGuardia and other similar institutions given initial student under-preparedness coupled with the demanding curricula, and combined with severe barriers that our students face. At the very least, enhancing both the STEM advisement team members and students requires continuous oversight, multidirectional and multimodal communication, useful data, and pervasive support, all of which require substantial institutional and personal resources. Furthermore, every team member must be wholly dedicated to student success for this advisement model to flourish. Although team-based advising for STEM majors as practiced by LaGuardia may not be appropriate for all institutions, all institutions can benefit from the methodology described above, wherein the college carefully considered the roadblock on their way to effective advising and used that information to develop the current team-based effort.

Our work in STEM advisement has focused on providing holistic, team-based support across Academic and Student Affairs. As described above, we see encouraging gains in retention rates from this advising model, specifically with the institution of the FYS course in the STEM curricula. Building on these achievements, we will continue to bolster student success by implementing a culture of developmental advising in all LaGuardia courses, not just the FYS. To provide faculty with the tools that they need, we have created a number of engaging professional development workshops. The College is further reviewing student outcomes by teams, as it seeks to further refine the advisement model and boost retention and graduation rates.

Under the team-based system, we advise collaboratively, across departments and divisions and with community partners to help make connections to better serve students, affording STEM students opportunities to succeed. Bounous-Hammarth (2000) emphasized that student retention and achievement in STEM disciplines necessitates frequent motivation and continuous reinforcement of student engagement in mathematics and the sciences, coupled with academic preparation to increase analytical thinking skills. All colleges and universities can improve their STEM advisement success using a team-based approach if they commit to the integrity and connections between the five interconnected pillars discussed in depth above: 1) the student matters, 2) a supportive culture matters, 3) effective communication matters, 4) data matters, and 5) clear pathways and effective advisement matter. When this advisement integration is done well and as a team, with a genuine 'students-come-first-approach,' institutions and all

of their stakeholders, especially the students, will benefit exponentially. Most of us are familiar with the colloquial leadership adage, "there is no I in TEAM." However, as Jeff Edmondson, the Director of *StriveTogether* pointed out at the February 2016 ATD plenary luncheon Ed Talks, if you are truly committed to student success, then every individual must take responsibility in an organization and/or community for the collective team to make progress. Every STEM advisement team member must take responsibility for our students; we must both individually and collectively nourish the various institutional support structures to help advance STEM student success (Edmondson, 2015).

Acknowledgements

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