Advising and Progress in the Community College STEM Transfer Pathway

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Community college students enrolled in science and technology fields face many challenges as they pursue transfer pathways to earn a 4-year degree. Despite clear links to student persistence, advising interactions that facilitate or inhibit transfer progress are not clearly understood. In this study, 82 community college students pursuing science and technology transfer-based programs of study participated in phenomenological interviews. Students described how professors, major advisors, and transfer office staff supported their progress by providing accurate information or referring them to helpful resources; students learned answers to unasked questions and stayed on track to transfer. Interactions impeded progress when initial advisors, in particular, provided misinformation, leading to frustration and costly delays. Implications for future research and practice are discussed.

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The modal entry point to higher education, the community college matriculates nearly 50% of first-time postsecondary students (Starobin & Laanan, 2010). Community college campuses are diverse, enrolling high percentages of first-generation and nontraditional-aged students as well as students of color (Bailey, Jenkins, & Leinbach, 2005). Although community colleges articulate many different objectives, including workforce training and adult education, the importance of the community college's transfer function has intensified in recent years (Dowd, 2008). Due to the current challenging economic climate, the growing attractiveness of the local community college, with low cost and added convenience, shows in the quickly growing enrollments at community colleges (American Association of Community College, 2011). Consequently, policymakers now underscore the need to understand the challenges of transferring from a community college to a 4-year institution as well as effective methods to improve community college transfer rates (Labov, 2012).

Students pursuing a career in a science, technology, engineering, or math (STEM) field benefit from the community college transfer pathway for earning a baccalaureate degree. Many STEM careers now require a 4-year degree (Carnevale, Smith, & Strohl, 2010). However, fewer than 10% of community college students nationwide select STEM majors, choosing business, education, or another field instead (Labov, 2012). The pool of STEM transfers grows more depleted as students progress through the required classes: Bettinger (2010, described in Labov, 2012) reported that fewer than 15% of initial STEM degree aspirants eventually earn an associate's degree in a STEM field. Many institutions prioritize admission for transfers with an associate's degree; therefore, the proportion of transfer applicants with an intended STEM degree is relatively small. Furthermore, the few men who earn associate's degrees in STEM fields outnumber women by a ratio of three to one (National Science Foundation, 2006). In fact, women earn 500,000 associate's degrees per year, but only 5% of those degrees are in a STEM field (Hardy & Katsinas, 2010; Packard, Gagnon, LaBelle, Jeffers, & Lynn, 2011).

Community colleges have tremendous opportunity to affect the growth and diversification of the STEM workforce. They enroll diverse students, those most underrepresented in STEM fields, by the hundreds of thousands. Although few community college students select STEM fields, even the slightest shifts within community college populations can extraordinarily affect the STEM workforce numbers. In this paper, we focus on movements that can influence the transfer progress for aspiring STEM majors within community colleges.

Role of Advising in Transfer Progress

Transfer rates remain low and discouraging because of their correlation with family income level; for example, first-generation college students from low socioeconomic backgrounds are three times less likely to transfer to 4-year institutions

than their peers; the patterns for students of color are similar to those of first-generation students (Bailey et al., 2005). We acknowledge that myriad barriers face prospective transfer students, including the need for developmental courses (Hagedorn & DuBray, 2010), family responsibilities, and financial pressures (Ornelas & Solorzano, 2004). However, persistent students transfer and reach their goals. We focus on academic advising because advising and student progress are linked, and advising practices are malleable (McArthur, 2005; Smith, 2007; Tatum, Hayward, & Monzon, 2006). Coleman (1988) described the importance of social capital—the set of resources, insider knowledge, and connections to opportunities—individuals can derive from interactions with others in their social network. Advisors in community colleges are an important source of social capital because they possess key information about requirements and steps in the transfer process.

Research suggests that advising, on the whole, benefits community colleges students. Bahr (2008), through a large-scale study of over 100 community colleges in California, found that advising was linked to long-term student progress, including with transfer to a 4-year institution. However, Bahr also cautioned that this study treated advising as a singular concept, but the term actually refers to many different sources and types of services; consequently, Bahr recommended that future research reveal the variability in advising and the ways in which advisors influence transfer progress. Indeed, a comprehensive social network can increase one's likelihood of accessing diverse sources of social capital, each with specific benefits (Ensher, Thomas, & Murphy, 2001). For example, as might be expected, teachers and advisors provide more school-based knowledge than often offered through home-based supporters, especially to first-generation college students whose parents may lack relevant information because they did not participate firsthand in the college experience (Stanton-Salazar, 1997).

In the community college realm, advising comes from many different sources: Faculty members can act as informal advisors about major selection and career options, and staff advisors from the transfer office can provide critical information about developing transfer applications. Although in theory, these advising resources seem plentiful, community colleges handle burgeoning enrollments with very limited resources. The ratio of students to initial academic advisors or counselors can range from 100 to 1 or 1,000 to 1, and students who seek advising only from only an official advising source experience limited access (e.g., Hagedorn, Moon, Cypers, Maxwell, & Lester, 2006). As a result, community college students may need to seek alternative sources of advising, such as faculty members, for college-related information. Many faculty members report that they provide transfer-related encouragement and information within their courses or through office hours (Tatum et al., 2006). However, the degree to which alternative sources of advising translate to transfer progress remains unclear.

Current Study

We examine the ways in which community college students experience advising interactions and the ways they perceive advising as supporting or impeding their transfer progress. Building upon Bahr's (2008) study, we wanted to learn more about the ways advising interactions facilitated transfer progress; specifically, we examined different sources of advising (e.g., initially accessed advisors, faculty members). We also acknowledge that advisors could impede transfer progress. In a previous study based primarily on short-answer survey data from students pursuing STEM fields in community colleges, we examined the sources of transfer delays (Packard, Gagnon, & Senas, 2012) and poor advising emerged as an important factor contributing to student delays. Poor advising included offering misinformation or failure to provide key information. Our previous study may relate to the Hagedorn et al. (2006) study that linked transfer delays to a lack of advising caused by resource constraints.

In this phenomenological study, focused on the advising experiences of students pursuing the STEM community college transfer pathway, we asked:

RQ1a. How do advising interactions positively influence the transfer progress of students?
RQ1b. Which functions of advising and sources of advising do students emphasize?
RQ2a. How do advising interactions inhibit transfer progress?
RQ2b. Which functions of advising and sources of advising do students emphasize?

Method

Participants

Overall, 82 students (40 women and 42 men) participated in our study. Thirty percent were

nontraditional-aged students (25 years or older) and 51% were first-generation college students (defined as neither parent having a 4-year degree). Most students were White, and 21% were students of color (3 African American, 6 Latino/a, 4 Asian American, and 4 multiracial students). More women (67.5%) enrolled in a science field than in math, technology, or engineering (32.6%). Conversely, more men enrolled in math, technology, or engineering fields (83%) than in science (17%).

We created this purposive sample from three community colleges in Massachusetts. Deans of science at each community college approved recruitment and facilitated our entry into core courses within the STEM departments of biology, math, engineering, and computer science to seek participants. Our research team, which included the authors and two assistants, also distributed flyers to students visiting the transfer office or the campus cafeteria. We invited students with the following characteristics to participate in an interview: (a) an interest in pursuing a STEM field, as indicated by their current major or career plans, (b) intentions to finish at the community college within one year, and (c) arrangements to transfer from their current community college to a 4-year institution to earn their first bachelor's degree. During recruitment, we found that nearly all of the women and many of the men we encountered, although enrolled in STEM course work, did not intend to pursue STEM transfer programs. This finding comports with the analysis by Hardy and Katsinas (2010) of enrollment trends nationwide.

Data Collection

Consistent with Moustaskas's (1994) phenomenological method, our semi-structured interviews were designed to encourage students to describe their experiences from their own perspectives. Each interviewer initiated the 45 to 90 minute telephone meeting by asking students to discuss their journey to this point on the educational pathway and to identify the most important factors or experiences, whether positive or negative, shaping their trajectory. Then students described the people and resources supportive of their educational and career progress. In response to a pointed probing question at this point in the interview, students reflected on their advising experiences. These interviews were recorded and later transcribed. To increase the trustworthiness of the results, the interviewer asked for participant feedback, and we also used member checking as suggested by Lincoln and Guba (1985). Specifically, after each interview, members of the research team discussed the narrative to identify ambiguous or unusual responses. Participants were recontacted as necessary to clarify their perspectives.

Data Analysis

We analyzed transcribed interviews using the phenomenological method as described by Moustakas (1994). First, as a form of immersion in the data (per Morrow, 2005) two of us read the interviews in their entirety multiple times to get an overall sense of participants' experiences of advising. We labeled relevant excerpts as positive/facilitating or negative/impeding, and then categorized them according to (a) the function provided by the advisor or the characteristics of the exchange and (b) source of the advising. After individual team members finished this process, we worked together to reach consensus in the naming of themes.

We organized data into a typology of functions and sources of advising. To clarify the sources, we used *initial advisor* to describe the person assigned during orientation or at the first course selection; this person was typically a staff member at the college, but a few were members of the teaching faculty, but none were on the faculty. We applied a *major advisor* label to indicate an advisor assigned when the student declared a major; it referred to the faculty member, staff, or administrator for students who indicated they had not previously established a faculty–student relationship. Professors who provided informal advising to a student taking his or her class or agreed to serve as a major advisor to a student who had asked them to serve in that capacity received a label of *professor. Transfer advisor* referred to a staff member in a transfer office.

When using a qualitative research paradigm, most researchers do not tabulate or report frequencies, and some would argue that doing so is antithetical to an interpretivist framework. However, we chose to provide frequencies to give the reader an overall sense of typical themes and sources procured from this sample. As Ryan and Bernard (2000) wrote, "Turning qualitative data into quantitative data . . . can produce information that engenders deeper interpretations of the meanings in the original corpus of qualitative data" (p. 778). In this spirit, we focus on the

Table 1. Advisors as facilitating transfer progress, $N = 82$

Theme	% Participants	Sample Quotations	Primary Source
Information	80	"Helped me to figure out course equivalencies."	Transfer advisor
		"Challenged you with different information."	Major advisor
		"A fountain of information."	Faculty member
Resourceful	12	"Directed me to professors I could talk to."	Faculty member
		"She knew . . . who to send me to, to talk to."	Faculty member
Emotional	20	"I was very homesick. Advisor told me what to expect."	Major advisor
		"My professor encouraged me"	Faculty member
Exposure	10	"I never would have thought about . . . otherwise."	Faculty member
Coaching	2	"Write me lists of things to do and check back in."	Transfer advisor

Note. Eighty-four percent of participants reported a positive advising experience.

meanings of advising as relevant to transfer progress, but we also incorporated, where appropriate, quantitative trends for emphasis.

Overall, 84% of participants described a positive advising experience that supported transfer progress, from which five different themes were identified (see Table 1). In addition, 54% of participants described a negative advising experience, in which the advisor inhibited transfer progress, and from which we identified four themes (see Table 2). Due to the gender discrepancy among STEM majors in community colleges and because community colleges tend to serve many first-generation college students, students of color, and nontraditional-aged students, we paid attention to and noted when certain themes did or did not represent the views of particular groups of students.

Results

Advising as Supporting Transfer Progress

Accurate knowledge. Students emphasized the importance of accurate knowledge; they appreciated when an advisor provided correct information about college navigation, including academic, career, and financial matters. Students linked accurate knowledge from advisors to their ability to stay on track with their transfer goals. Advisors provided students with information in multiple ways, from helping them strategically plan their time at community college and identify transferable classes to providing them with information on 4-year colleges. For example, one student shared her experience with her major advisor this way:

> The advisor sat down with me, told me what courses I had to take if I wanted to transfer within a specific time frame. She spoke with the head of the science department about what schools were "high quality" in terms of science and math programs. She also helped me figure out course equivalencies between the community college and the university.

Students described college navigation in a future-oriented manner; advisors not only gave students basic information, but also translated ways that knowledge could be useful in the future. One student explained that the professor, who served as his major advisor, was "very helpful in making sure I got all the information I needed . . . not only for school, but for life." Another student, who had two professors who were also his major advisors, said:

> They were very enthusiastic, gave examples, and made you think about goals in your life, and not just the class. Therefore, they challenged you with different information and taught you how to deal with people when you go looking for a job. So it was not just simple projects and grading—it involved more of an understanding of where we were going in the future.

Yet another student described the ways in which his major advisor helped him think about his time at the community college and his prospects for transfer: "My advisor who was also my professor talked a lot and encouraged transferring and told me about options. We actually talked about it a lot and we would have one-on-one meetings about transfer."

Advisors were especially helpful in explaining the link between students' time at the community college and their future at 4-year institutions. Encouraging a student to think thoughtfully about selecting classes at the community college, as

Table 2. Advisors as impeding transfer progress, $N = 82$

Theme	% Participants	Sample Quotations	Primary Source
Lack of knowledge	32	"My advisor didn't tell me that."	Major advisor
		"She didn't know what degrees would transfer."	Transfer advisor
		"My advisor did not put me in a math class."	Initial advisor
Not helpful	13	"She showed me the webpage."	Transfer advisor
Not available	9	"It was a bit rushed."	Transfer advisor
		"Nobody was there."	Major advisor
Lack of interest	6	"I don't feel she worked with me."	Initial advisor
		"No discussion."	Initial advisor

Note. Fifty-four percent of participants reported a negative advising experience.

well as keeping doors open to a 4-year institution, advisors push students a step closer to reaching a baccalaureate degree.

With the help of an advisor, students with goals of transfer in their first few semesters effectively planned a transfer-oriented path. Advisors ensured advisees selected classes transferable, not only to the 4-year college, but also for a program or major. Respondents highly valued advisors who provided information on articulation agreements between 2- and 4-year colleges. Not all students had been aware of such agreements until their advisor shared this information. For example, when describing a major advisor's role, one student said,

> I guess the community college's agreement with the local university—which I didn't even notice!—that made a big help with just the courses they put me in. My advisor made it easy. I hear a lot of about kids having problems, but I didn't have any problems.

Without this information from his advisor, this student may have experienced the same issues that arose for many others who remained uninformed about their transfer options until the end of their time at the community college.

Proactive advisors were not alone in providing accurate navigational knowledge. At the behest of students, advisors answered questions, explained terms, and otherwise provided clarification about academics, careers and internships, and financing a college degree. They not only addressed students' voiced concerns, but prodded students forward by asking questions. One student described how a professor helped steer her in a directed career path,

> She gave me info on forensics, and based on this info, I changed my major. . . . When it came time for me to take my intro to forensics class I saw her very often and she was the one who eventually ended up providing me with information.

Another student described how the transfer advisor helped her to initiate research on career options: "I met with her 2 to 3 times. She provided me with information on career web sites where I could look up my interests and they would give me income information and job availability across the country."

Students expressed deep concern over financing a 4-year degree. Students benefited from advisors knowledgeable in this key area because they appreciated information on different ways to fund their continued education such as grants, scholarships, and federal financial aid. When speaking of a faculty member, one student said, "My advisor is a fountain of information with regard to information about grants." Another spoke highly of a transfer advisor, "She wrote me e-mails. If I did need anything, she wanted to help. I also applied for the scholarship; she was helping me a lot with that." Similarly, another student described a transfer advisor who made her aware of the financial aid process, helping her realize that she needed to complete an application every year she continued her academic career, "My advisor helped me navigate through the system—she's the one that told me about the FAFSA [Free Application for Federal Student Aid]." Advisors helped students to clarify their interests and direction, and they increased the feasibility of financing a 4-year degree. Informational interactions in which the advisor provided accurate knowledge regarding finances diminished a major worry of advisees, and in turn facilitated transfer progress.

Resourceful referral. Advisors were viewed positively even when they did not personally

possess specific knowledge. When an advisor demonstrated resourcefulness by referring the student to others with knowledge most applicable to the situation, the advisee saw the steps to follow ahead. One student shared a positive experience with a transfer advisor, "My advisor directed me to professors I could talk to and that would write letters of recommendation." Resourcefulness proves an important advising skill for community college transfer students in STEM who need to access the right information at the right time, and according to our research, advisors without the appropriate expertise in a particular area provided students with a positive experience by directing them toward another person who possessed such knowledge.

Students also perceived resourcefulness as helpful when advisors directed them to both community college and 4-year resources. When describing her major advisor's ability to point her in the right direction, one student shared:

> I had a really great advisor at the community college. She knew a lot about the process and who to send me to, to talk to. My advisor would tell me that 4-year schools were coming on campus so I could meet them and check in. She knew I was aiming for a [private 4-year college] and when the representative came, my advisor made sure I met with her. They did a good job of getting you in touch with the institution afterwards so you are not going in blind.

In this way, advisors helped to broker interactions with key persons at the 4-year institution, which helped students to move forward on their transfer pathway.

Emotional support. Another prominent theme of advisor advocacy of transfer progress, emotional support, helped students to regroup after a personal setback, whether an academic struggle or a funeral. Advisors at the community college under study typically engaged in active listening or gave encouragement. Students noted how such conversations and reassurance helped them to stay on track with their transfer plans. When reflecting on an experience with a transfer advisor, one student shared, "I was very homesick and was in culture shock when I first got here. My advisor told me how it is [here], and what to expect." After a personal setback, another student shared, "My professor encouraged me to make sure that I was still going to continue on with transferring." Having someone provide a range of emotional supports helped students to get through various tough times throughout the semester.

Exposure to new opportunities. Advisors facilitated transfer progress by proactively exposing students to new opportunities. One professor introduced an information session for a selective college by explaining that the student needed to attend a mandatory meeting. The student recalled, "I never would have thought of [a range of private 4-year colleges]."

Advisors opened doors to new career opportunities as well. For example, one student explained the outcome of a professor's encouragement to apply for a job in the biological sciences: "I think I have gained the drive to get into science jobs that are related to my major, and I've never really had one before." When an advisor exposed new opportunities, students began to think more about their academic futures and the career paths they would take, and this process increased their motivation and further solidified their commitment to transferring as they realized the need for the 4-year degree to meet their future goals.

Coaching. A final theme, albeit atypical, reflects advisor coaching of students toward the completion of goals and monitoring of their progress. One student shared: "[The transfer advisor] would write me lists of things to do and check back in with me." Just from the simple act of writing lists, the student kept on track to transfer and was alerted to the need to complete important tasks.

Sources of advising. Students emphasized that knowledge about college navigation was most often provided by a transfer advisor, a major advisor, or a professor and not typically offered by initial advisors. Community college professors demonstrated resourcefulness and support for exploring new opportunities. They, along with major advisors but not initial advisors, most frequently offered emotional support. They, along with transfer advisors, coached advisees. These findings show the importance of multiple sources of advising, in this case, the transfer office advisor, major advisor, and a faculty member from a course.

Demographic trends. Students across demographic groups responded similarly to generate themes of advising functions and the sources of the advising. However, three of the themes were grounded almost exclusively in the experiences of women: emotional support (men represented only

5 of the 17 participants addressing this aspect of advising), opened doors to new opportunities (1 man among 8 participants talked about it), and coached toward goal completion (both respondents were White women).

Negative Advising

Lack of knowledge. Students emphasized that an advisor's general lack of knowledge about college navigation or the transfer process led to a negative advising experience. Often, students felt frustration upon realizing that advisors did not share critical information with them. One student explained the results of unsatisfactory advising in her first semester with an initial advisor:

> The advisor that you were given at first wasn't your regular advisor. It was just someone temporary. They all advise you to take four classes a semester instead of five. Of course, after a year, I realized I wasn't going to finish on time... [that initial advisor's recommendation] was going to set me behind.

Another student explained that her major advisor only provided her with bits and pieces of information:

> I still feel like I don't know very much at all about transferring…but she was able to tell me lots of things that I didn't know. But then I'd find out other things and I'd go, "Oh wow, my advisor didn't tell me that."

Although given some information, the student felt she needed to seek out other sources of information. In other cases, students felt the advisor did not possess relevant information. One such student, frustrated with her experience in the transfer office, explained: "Not only did she not know what classes would transfer, she didn't know what degrees would transfer out of the community college."

Failure to receive key information for the community college experience and the transfer process adversely affected student progress. In the interview, many students shared their difficulties with advising and their confusion over the types and timing of STEM classes to take. One student explained how her college's advising center propelled her on the wrong path, "The [initial advisor] I had didn't have any idea about anything related to the forensic science program, so when she scheduled my classes, it was just based on her knowledge of what I should be taking." When the advisor knowledge base was limited, advisees often registered for incorrect prerequisites such that the STEM pathway proved less feasible and required more time than planned to complete. For example, a student not planning to pursue a transfer-based pathway, initially, shared:

> When I registered for my first semester, my [initial] advisor did not put me in a math class. Because I needed four math classes in order to graduate and I did not take one during my first semester, I was not able to complete my degree in four semesters.

This lack of information from the initial advisor led the student to require additional time to complete the degree. Students without proper information also experienced stress:

> I really wanted to graduate and really wanted to transfer. My advisor was helpful but he wasn't really answering my questions that I needed. I had nobody to tell me which types of classes I needed to take to graduate in spring on time. As soon as I entered that last semester, it was very hectic for me because I really wanted to graduate.

Missing key information was particularly frustrating for students with a specific idea for their 4-year transfer destination; they hope for a purposeful selection of courses that would align with their transfer goals. For example, one student explained:

> The first thing I did was go see the transfer advisor at [our community college]. I really didn't feel that was helpful. The transfer advisor didn't seem to have information concerning general requirements at the university. She didn't have a firm grasp on which courses you needed and which ones transferred as general education courses.

The student articulated a better understanding that the classes needed to align for transfer, but the transfer advisor, according to the student's report, appeared ill equipped to answer important questions on the process.

Another student shared a similar situation when talking about his advisors: "[The transfer office staff members] were not very supportive when I was in a transfer crisis. They too didn't tell me that I couldn't transfer into the local university through the program I was interested in." A student expressed disappointment upon realizing he had missed an important opportunity: "I had made an appointment to discuss my transfer. Originally I had planned to apply to the university. I had talked to [the transfer advisor] at my community college and she made it sound simple that I could just transfer." This student later discovered that the advisor provided bad information, and as a result, he did not qualify for the articulation agreement for his program of study and changed his transfer goals.

Participants in the study regarded advisor lack of information as a negative influence on transfer progress. For some students, a lack of information created inconvenience or frustration due to necessary additional legwork. For others, it resulted in serious financial repercussions as taking wrong courses, missing a required course, or not knowing the requirements for a particular program cost students more than necessary or planned.

Lack of resourcefulness. An advisor's lack of resourcefulness, demonstrated by failure to offer an appropriate referral, left advisees unimpressed. An advisor, for example, may indicate that relevant information is available but not provide specificity or assistance with a particular referral. One student explained, with disappointment, her experience with an advisor at the transfer office, "She showed me the web page . . . I felt like now that I had the web page, I could explore by myself." A lack of resourcefulness led most students to rely on themselves and other sources of information that did not involve a school-based person or resource. When students took it upon themselves to find information on college navigation and ways to make a successful transfer, they missed out on key insider knowledge that a helpful school-based advisor could have shared; for example, experienced personnel know the best questions to ask in the process or the problems to anticipate.

In a far-reaching consequence, negative advising interactions turn students away from community college advisors in general. After a negative experience with a transfer advisor that did not lead to a referral to a helpful resource, one student shared, "I didn't listen to that side of the school anymore. I ended up doing all of my scheduling. Once I got the ability to do it on my own, I stopped showing up to the transfer office."

Unavailable advisors. Another theme of negative advising emerged as failure to provide individualized support. One student, who met with an advisor from the transfer office, explained, "I feel like it was a little bit rushed, all of the meetings with my transfer advisor, and I'm not entirely clear on how the process is going to go." Uncertainty, such as this advisee experienced, may lead students down an indirect path such that they may select nontransferable courses that slow their transfer progress. Many students who felt their advisor acted too busy to meet with them described their inclination to give up on advising:

> When I went to [my major advisor], I never really got hold of her. I went to her room and nobody was there at her office, and no list on her door to sign up for appointments or classes. So I did things on my own and signed up for classes online by myself.

As with those dealing with unresourceful advisors, students assigned an unavailable advisor were more likely to turn away from advising in general.

Disconnected advisors. Advisors clearly disconnected from the student, discerned by a demonstrated lack of interest in the student or in the advising process, emerged as a theme in our study. One student shared this detachment from his initial advisor:

> When I first sat down she asked me what I was interested in but then she completely went off [track] . . . she just started saying "well you can do this and this. . . ." She didn't stop and listen to hear what I really wanted to do or what I'm interested in. She pretty much said "Okay, here's the stuff you need to take" and she sent me on my way. She was just pulling classes out and telling me things that she knew I would have to take. I don't really feel like she worked with me.

Another student summarized a similar experience with an initial advisor, "There was no discussion about what my strengths and weaknesses were or what my long-term goals were." In these situations, students did not feel they received school-based advising support. Consequently,

some sought another advisor. Although these students did not indicate that disconnected advisors negatively impacted their transfer progress, they clearly described negative feelings that certainly did not facilitate their progress.

Source of advising. The student respondents pointed to initial, major, or transfer advisors as poor providers of information on navigating the college. They attributed a lack of resourcefulness to transfer office and major advisors. In addition, they reported that the major advisor was less available to provide individualized support than the transfer office advisor. Their interaction with an initial advisor was the most likely to contribute to a perception that advisors are disconnected. Only one student reported a negative advising experience of any kind with a community college professor.

Demographic trends. Students across demographic groups reported similar negative themes in function and sources. More men and first-generation college students reported negative experiences with a community college advisor than did women and continuing-generation college students. In addition, no students of color cited that an advisor seemed too busy to interact.

Discussion

We examined the advising experiences of community college students pursuing transfer-based programs in STEM fields. Students valued advising interactions through which they gained accurate knowledge and observed resourcefulness. Through positive interactions with transfer office and major advisors, and community college professors, students enhanced their knowledge of the transfer landscape, articulation agreements within various colleges, and scholarship and financial aid deadlines. Advisors provided important information and addressed areas in which many students lacked awareness. We learned about advisors who raised questions that students did not think to ask or who exposed them to new opportunities. Emotional support, such as listening or providing encouragement, benefited students by reassuring them about their chosen trajectory. This study extends previous research by Bahr (2008) that linked advising to transfer progress among community college students by elucidating the ways in which advising interactions facilitate student goal achievement.

We also highlighted the range of advising sources that positively influenced students along their transfer pathway. We observed the role that faculty members played by teaching students about opportunities in their fields of study as well as support from major and transfer advisors. Students reported that multiple advisors fostered confidence and motivation to continue their pursuit of STEM fields at the 4-year level. This research supports the work by Tatum et al. (2006) and Smith (2007) documenting ways the faculty provides an important advising resource beyond the official advising channels in community colleges.

We extended the study by Hagedorn et al. (2006), which emphasized that a lack of access to community college advisors can be detrimental to transfer progress, and our own research (Packard et al., 2012) that linked delays in transfer progress to misinformation from advisors. Because necessary math and science courses of study tend to be prescriptive and sequential, ineffective advising for STEM majors magnifies the potential long-term negative consequences. Missing key information, including that on transfer prerequisites or nuances of articulation agreements, can irreversibly affect the feasibly of a student, especially one with limited resources, to pursue a STEM major. Students in our study did not describe advisors actively discouraging their pursuits; however, they did report that lack of accurate information, typically from initial advisors in their first semester, led to indirect but real hindrances, manifested in taking incorrect classes, to student progress. Students also felt discouraged and experienced uncertainty when they encountered an advisor who was not investing in the advisee, connecting to the student's goals, or communicating relevant information.

Limitations and Future Research

This study is limited by certain features. The students were located in one region in Massachusetts, and the only data source came from student interviews. Future research could include advisor interviews, akin to the work conducted by Tatum et al. (2006), to gain perspective on the practitioner view of advising knowledge and resourcefulness. In addition, future researchers could examine whether different sources of advising or different functions of advising were predictive of transfer progress or eventual degree attainment.

A more racially and ethnically diverse sample of students would offer perspective on the advising for students of color and the complexities of cross-racial advising interactions, which are important considerations because students of color and low-income students are less likely to transfer (Bailey et al., 2005). Previous research shows that the race of the student could influence whether an advisor will

dissuade her or him from taking a heavy course load; that is, White advisors were less likely to warn Black students (Crosby & Monin, 2007) that they may be at risk of academic overcommitment. We encourage researchers to undertake studies that increase the understanding of the nuances of ways advising can help facilitate student progress and how cross-race, cross-class, and other factors can complicate advising interactions.

Implications for Practice

Community colleges can increase the personnel flowing into the STEM pipeline by sparking an interest in students, encouraging them to progress in STEM majors, and supporting associate degree earners in STEM fields to transfer to 4-year institutions. Despite resource constraints, community colleges need to equip initial advisors with the ability to be as knowledgeable and resourceful as possible. Students in community colleges pursuing STEM fields and transfer goals must receive careful advice about prerequisites and differences in 4-year program requirements. Many cannot afford to miss important information about prerequisites, transferability of credits, or deadlines. Advisors who inquire about their advisees' transfer plans can straighten the path to education beyond the community college by helping them effectively plan their time in the community college. One can also see the value of advisor training with regard to improving interpersonal communication; these programs can be viewed as an investment in both retention and transfer (Hughey, 2011). In this digital age, STEM-specific transfer web sites may prove very helpful to students and initial advisors alike by increasing access to knowledge and materials focused on STEM disciplinary-specific program requirements.

In addition, because of the positive role that the community college faculty can play in the advising experiences of students, community colleges could encourage stronger partnerships between the faculty and advising units, including the transfer office. For example, transfer advising can be embedded into the classroom experience, an approach consistent with the view that advising is teaching (Crookston, 1972/1994/2009; Packard, Tuladhar, & Lee, 2013; Smith, 2007; Tatum et al., 2006). For example, faculty members can reach many students in introductory courses by encouraging transfer to a 4-year institution and by providing information about the steps necessary to transfer and ways to successfully negotiate the 4-year curriculum in their course lectures.

Because no advisors can be knowledgeable in each and every area, resourcefulness is a key skill. A demonstration of resourcefulness tips the advising experience in a positive direction; without witnessing an advisor's resourcefulness, students may lack direction and form a negative feeling about advising in general. Community college students pursuing STEM fields, hoping to transfer, simply cannot afford missteps. By collaborating on advising across the institution, community college stakeholders can enhance the advising of students, invest in students navigating the STEM transfer pathway, and positively influence the STEM workforce.

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