Professional Advisers in Engineering and Technology Undergraduate Programs: Opportunities and Challenges

By Gretchen A. Mosher

ABSTRACT

The basis of high quality academic advising is a strong relationship between the student and the adviser. Historically, these relationships have been cultivated between faculty advisers and students. Increasingly, the "faculty-only" model is declining, as institutions have chosen to hire non-faculty staff to serve the role of academic advisers. These "professional advisers" focus solely on advising, with limited research, teaching, and governance duties. This article summarizes the research on the use of professional advisers as compared with faculty advisers, and outlines challenges inherent to the professional adviser model in an engineering and technology department at a research-intensive land grant institution. Information on the use of professional advisers in an engineering and technology department may be useful to other engineering and technology-oriented departments, specifically those managing large enrollment increases. Factors considered in measuring advising effectiveness for professional and faculty advisers will also be discussed. As administrators in engineering and technology departments add to the list of tasks required for faculty, the use of professional advisers shifts the faculty mentoring focus toward disciplinary and career pursuits, roles faculty have indicated they are comfortable assuming.

Keywords: academic advising, administration, undergraduates

Effective academic advising has been associated with several positive characteristics in undergraduate students, including cognitive and social development and persistence (Pascarella & Terenzini, 2005). High quality advising has also been shown to play a critical role in student academic, career, and personal development (Beggs, Bantham, & Taylor, 2008). While post-secondary institutions profess a commitment to advising, the quality of the advising, as perceived by students, varies in quality and effectiveness (Hossler, Ziskin, & Gross, 2009).

Facilitating effective advising is challenging. Hale, Graham, and Johnson's (2009) survey of over 225,000 undergraduates at over 425 U.S. post-secondary institutions found academic advising was second only to the quality of instruction as the most important component of the college experience. Cox and Orehovec (2007) added that when students are connected and engaged with their advisers, they are more likely to feel valued as individuals, enhancing their likelihood of academic success. A high level of engagement is especially important at high enrollment, research-intensive institutions. Even though a strong connection between student and adviser has implications for multiple positive student outcomes (Vianden & Barlow, 2015), students often report dissatisfaction with the academic advising they receive (Allen & Smith, 2008: Keup & Stolzenberg, 2004).

Historically, faculty advisers have borne the majority of the advising load. Habley (2003) noted that faculty advising was influenced by an increase in the diversity of students served by post-secondary institutions, the evolution of the curriculum to include wider areas of study, and increased expectations for faculty performance. Faculty continue in an advising role at many institutions, but the question of whether this is the best model to meet student advising needs is raised by Allen and Smith (2008) and others (White, 2013). Baker and Griffin (2010) noted that traditionally, faculty advisers were expected to assist students in with the needed navigation of academic rules and policies, yet others have reported that effective advising is much more than knowledge of major and degree requirements (Allen & Smith, 2008).

Accordingly, much has been written on the components of effective academic advising (Allen & Smith, 2008; White, 2013; White, 2015). The research of Janine M. Allen and Cathleen L. Smith (Allen & Smith, 2008; Smith & Allen, 2006) summarizes five domains drawn from over 30 years of literature on the subject, including integration, referral, information, individuation, and shared responsibility. Allen and Smith also reported that although faculty

found all five domains important, they did not feel they were responsible for cultivating all five with their students. Specifically, Allen and Smith (2008) discovered that student and faculty perceptions of effectiveness aligned fairly closely on the domains of information and individuation, and were further apart in the domains of integration and referral.

Sheldon, Garton, Orr, and Smith (2015) found three factors that predicted student satisfaction with their adviser's performance: knowledge, availability, and autonomy supportiveness. Of the three, autonomy support was the strongest predictor for student satisfaction as well as student cumulative GPA and student time spent with advisers. Autonomy support was defined by Sheldon et al. (2015) as the ability to communicate and counsel without forcing the will of the "authority" on the "subordinate." In this case, the authority is the adviser and the subordinate is the student. The construct of autonomy support has been studied across a variety of domains, according to Sheldon et al. (2015), including counseling, medicine, parenting, management, and others.

Baker and Griffin (2010) added that high-quality advisers ensure that students have the information they need to make good decisions. Baker and Griffin (2010) also noted that the mentorship of a student often falls outside sharing academic information. Smith and Allen (2006) and Allen and Smith (2008) reported that not only are many faculty members uncomfortable advising outside of the academic realm, they do not believe it is their responsibility. For this reason, administrators have considered other options.

Responsive and high-quality advising is an important component in retaining STEM students (Meyer & Marx, 2014). STEM fields have struggled to recruit and retain students, even though data have shown little academic difference in those who persist and those who do not (Lichtenstein, McCormick, Sheppard, & Puma, 2010; Seymour & Hewitt, 1997). The so-called leaky pipeline to STEM professions is well known by researchers; however, the reasons students leave are less universal. Effective academic advising is hypothesized by many researchers to play a significant role in student persistence and retention (Geisinger & Raman, 2013; Pascarella & Terenzini, 2005;Vianden & Barlow,

2015). Yet, the academic advising literature has not examined the role of academic advisers specifically, especially in the fields of technology and engineering.

As administrators seek to optimize the use of faculty's time with fewer financial resources, professional advisers become one option to meet the advising needs of undergraduate students while improving the quality of advising (Sheldon et al., 2015). Engineering and technology departments, like most STEM fields, teach a hands-on and practical curriculum, which takes additional time and preparation (Asunda, Kim, & Westberry, 2015). The teaching approach leaves faculty with even less time to take on advising tasks. Professional advising personnel can address some of these challenges. These advisers are generally hired to meet a broader set of student needs, including academic and curricular needs, career exploration, transfer articulation agreements, development activities, and recruitment (Self, 2011). When professional advisers address these student needs, it leaves faculty with more time to pursue research, service, and instructional activities

Professional advisers are not disciplinary experts; rather, their expertise is in student development and university policies and procedures (Self, 2011). Professional advisers have the academic preparation and availability to provide effective service to students in the five domains advocated by Smith and Allen (2006) as well as the three factors described by Sheldon et al. (2015). Additionally, professional advisers are qualified to manage complex and time-consuming mentoring issues, including events related to student resilience and academic fit. They also generally have a broad knowledge base of campus resources for efficient referral of students for mental health, financial, and other challenging obstacles that can delay graduation. The use of professional advisers does not remove the faculty from a mentorship role, but it shifts the focus of the relationship to a disciplinary mentorship and "developer" as described by Baker and Griffin (2010).

BACKGROUND

Retention of STEM students is a well-documented challenge, but the reasons for this vary. Research on faculty perceptions of student persistence in

STEM studies shows study habits, commitment to educational goals, and family support as the primary influencing factors (Ortiz & Sriraman, 2015), but other researchers report that the main reasons students depart STEM fields are non-academic (Geisinger & Raman, 2013; Marra, Rodgers, Shen, & Bogue, 2012).

A primary focus of the advising team in the author's department has been to increase recruitment and retention of students who are good fit for the curricular programs in the department. The author's University has seen dramatic enrollment increases in the last 5 years and the use of professional academic advisers has limited the negative impact these higher enrollments have on faculty time. Yet, the increased enrollment has not been without challenges.

Little research has been completed on the use of professional advisers in engineering and technology fields or on the evaluation of professional academic advisers, especially in high enrollment departments within a research-intensive environment. A second area unexplored by previous literature is best practices for advising students who transfer out of the "E" of STEM fields into other disciplinary areas, specifically into the "T" component of STEM. Past analyses of these students suggest they may have advising needs that differ from students entering directly from high school.

As engineering and technology programs nationwide struggle to recruit and retain graduate students and prepare future faculty, appropriate undergraduate preparation and early professional engagement in the field is critical (Martin, Ritz, & Kosloski, 2014). Academic advising is hypothesized to play a key role in promoting student success, which is not only important in the short-term to ensure an adequate supply of engineering and technology professionals, but is also important for the long-term sustainability of the field of technology and the development of its future faculty. Therefore, a better understanding of best practices for working with technology students is needed.

The goal of this manuscript is to share the approach and philosophy for using professional advisers in an engineering and technology program at a research-intensive university in the Midwest United States. A specific focus on how students who transfer into the department from other engineering departments are welcomed into the department makes up the first portion of the article. The second portion proposes an evaluation plan to measure the effectiveness of the advising unit. Research opportunities to explore advising with internal transfer students in STEM will follow in the conclusion of this article.

Characterizing Students and their Needs

Undergraduate enrollment at the author's University has seen a large increase of students during the past 5 years. A major challenge of the increased enrollment has been handling students who transfer from engineering "E" fields into technology "T" fields. These students are termed *internal transfers* -- defined as students who transferred into a departmental major from another major within the university rather than as a transfer student from another institution or one entering directly from either high school or the military.

Institutional data from the author's department show that during 2015-2016, approximately 80 percent of internal transfers into the field of engineering technology – including the majors of agricultural systems technology (AST) and industrial technology (ITEC) -- transferred from an engineering discipline. The majority of internal transfers are male students.

Internal transfer students have wide variations in background, academic success, and perceptions of both the University and higher education. For this reason, a primary goal of the faculty and advisers is to acclimate and integrate the internal transfers into the department and provide them with guidance on its culture, expectations, and values regarding student development. A secondary goal is to (re)build confidence and efficacy in students whose plans in their initial chosen major did not turn out as expected. The academic advising team is an important welcoming link to students entering the department from elsewhere in the University. To address academic and social challenges of internal transfer students, faculty and advisers focus on a quick integration into the department through a variety of course experiences, administrative systems, and social activities.

Student feedback on the quality of academic advising in their "new" department has been very positive. Many of these students have not had positive academic experiences previously. When they transfer into the department, the academic adviser is the first person they interact with. For many of them, it offers the first positive step toward their successful completion of a degree. From an anecdotal perspective, the value of a positive interaction with an academic is critical. However, little research has quantitatively examined the value of these initial interactions.

Facilitating Successful Transfers

The goal of both faculty and advisers is to facilitate a successful transfer experience for each student. To enable this, several programs are implemented. Initially, a greater level of guidance is in place, with greater levels of independence and self-sufficiency expected from students as they near graduation. The first two years in the major are characterized by coursework to familiarize students with departmental labs and foundational knowledge in mathematics, chemistry, and physics.

The professional adviser team plans, administers, and leads the two foundation courses in engineering and technology. As part of the foundational courses, students tour two or more industry sites to expose them to opportunities

in their new field of study. Alumni and faculty panels provide information for students on advanced coursework and internship experiences.

Following the principles for effective undergraduate education advocated by Chickering and Gamson (1999), the advising team works to introduce new students in the department to faculty to enhance faculty/student contact. Faculty members are the students' first link with the discipline so the advising team plans and oversees several formal and informal contact opportunities between students and faculty during the academic year.

Formal opportunities include faculty panels where students ask questions about coursework, professional opportunities, and career specifics of teaching faculty and tours of laboratories and teaching areas. Tours of labs and programs in power machinery, fluid power, electricity, bio-processing, and occupational safety are presented. These give students a good understanding of the expectations of the department while encouraging student and faculty contact, both good principles identified by Chickering and Gamson (1999). Informal opportunities include an ice cream social, held in the late afternoon in the fall semester and a breakfast break with coffee and doughnuts, held in the spring semester. Both events run

TABLE 1: Characteristics of departmental enrollment trends and gender balance

Major	Spring 2016 Enrollment	Internal transfers IN 2015-2016	Internal transfers 2015-2016 OUT	Gender Proportion
Agricultural Engineering	192	31	48	Males 83.3% Females 16.7%
Agricultural Systems Technology	206	23	12	Males 94.7% Females 5.3%
Biological Systems Engineering	97	21	2	Males 46.4% Females 53.6%
Industrial Technology	269	93	11	Males 95.2% Females 4.8%

approximately 90 minutes and are open to all undergraduates in the department. Faculty and staff are invited to meet students, introduce themselves, and engage in brief conversations. These events encourage student-faculty contact as outlined by Chickering and Gamson (1999) in their seven principles of good practice in undergraduate education.

These two activities – social events and foundational courses – coordinate with the department's learning community programs. Learning communities are created to enhance the student undergraduate experience through elements such as teamwork, trust, and diversity to encourage participation and sharing of leadership tasks (Ancar, Freeman, & Field, 2007). The current departmental learning communities are course-based, meaning that engineering and technology students take one or more courses together, along with other opportunities to engage with peers, student mentors, and faculty. Another important component is the use of "peer mentors" – juniors and seniors in the major that are assigned to mentor small groups (12-15 students in each group) of new students.

The engineering and technology learning communities in the department have been in existence for nearly 20 years (Freeman, Field, & Dyrenfurth, 2001) and during that time, multiple changes in implementation and administration have been made. However, the original focus on increasing the interaction of students with their peers and with the faculty remains (Freeman, et al., 2001). This focus aligns well with the goals of the advising team and with the seven principles of good undergraduate education (Chickering & Gamson, 1999). Chickering and Gamson's (1999) seven principles of good undergraduate education have been in place for nearly 30 years, yet remain relevant for contemporary administrators and faculty.

The last informal opportunity faculty and student have to interact is at the graduation reception, held on a weeknight at the end of the fall and spring semesters. Graduating seniors are invited to a meal where they are invited to share their future plans and favorite memories of their time in the department. Faculty members are also given the opportunity to share final words of advice with students and wish them well on future endeavors. The event is a business casual, with a light meal served. The evening ends with photos taken of the graduating students, one photo that is serious and one that is less serious. The photos are then posted on the department's website and broadcasted through the department's Twitter and Facebook pages. The semester ends on a high note and lets students know that faculty in the department are invested in their success. All of these events are coordinated by the academic advising team and administrative staff. The events have been very successful in making students feel valued and connected at the beginning, middle, and end of their affiliation with the department.

A successful internal transfer experience is only partially related to the social aspects of a department. Another important factor is the speed with which a student transferring from another department can complete the required coursework and graduate. Internal transfers come into the department with a variety of coursework experiences on their record. Some have only one semester in the higher education, whereas others bring 2 years of community college records plus one or two semesters of 4-year transcripts. The academic status of students also varies widely. Some students transfer into the department with GPAs of 3.5 and above, but others have one or more academic dismissals in their history before they find a degree program that fits their background and skills.

It is in these cases that the quality of advising can play a large role in the success and efficacy of the student. Advisers play a large role in first introducing the department and welcoming students in, but in the second case, and perhaps more important one, advisers work with the student to identify a successful path forward in the curriculum.

One significant way advising staff can facilitate the student's curricular path forward is through enrollment management. Due to high enrollments in the engineering and technology programs, some form of prioritizing is necessary to ensure students are taking courses in the most efficient manner. Using criteria such as graduation date, number of credits, and existing schedule, advising staff manage the complex task of getting the right students in the right set of courses so that they can graduate on time. The

key performance indicator for this task is to have no student graduation delayed because of simple logistic issues related to getting students into needed courses. Thus far, the department has met this goal.

Undergraduate academic advising plays a major role in the academic, social, and emotional development of undergraduate students, as well as in the successful retention of students (Hossler, Ziskin, & Gross, 2009). In the author's department, students bring additional advising challenges, as addressed previously. Programming and academic advising practices follow the seven principles of high-quality undergraduate education, but the faculty have also tried to be creative in addressing challenges of high enrollment and students with unique advising needs. Because of the resources invested in effective advising at the department level, an evaluation plan for the undergraduate advising program is critical.

Approaches to Evaluating Advising

Evaluation of academic advisers is not simply a review of job performance. Professional advisers oversee many aspects of undergraduate degree programs and interact with students, departmental faculty and staff, and student services staff across the University and beyond. Indeed, as reported by Beggs, Bantham, and Taylor (2008), academic advising plays a major role in student life choices such as academic major or career. Young-Jones, Burt, Dixon, and Hawthorne (2013) presented six advising factors that were significantly related to student success. These factors include: accountability, empowerment, student responsibility, student self-efficacy, student study skills, and perceived report. These factors build on the idea that advising is grounded in teaching and learning; but include other evaluative components, as noted by Campbell and Nutt (2008) and others. Campbell and Nutt (2008) also suggested the implementation of structures and programs that recognize and reward the value of high quality academic advising.

For this reason, the evaluation of undergraduate advisers is critical and includes feedback from students, faculty, and staff from within the department. The process used by the Author's department is based on factors identified by Young-Jones et al. (2013). Student feedback is gathered from students through an online survey. Students are generally given approximately 10 weekdays to complete the survey, and an automated email reminder is sent to each student regularly until he or she submits the survey. Departmental faculty and staff may also provide feedback to the faculty supervisor of the advisers, following an existing departmental procedure for faculty to evaluate the job performance of professional staff they supervise. Finally, the supervisor holds a job performance meeting with each academic adviser. A summary of the meeting discussion and recommendations should be forwarded to the adviser for review before the documentation is submitted to departmental and university human resources.

The following 7 questions are examples of questions students could answer using a scaled survey instrument.

- My adviser is well informed about rules, procedures, and course selection. If the answer isn't known, my adviser helps direct my question to appropriate resources.

- My adviser is available through office hours, telephone, email, or office appointments, if necessary.

- My adviser keeps appointments when made. She/he follows through with efforts to determine answers to questions.

- My adviser encourages me to contact her/him. She/he expresses interest in me and shows concern for my problems and my progress in the program.

- My adviser offers suggestions and evaluations. She/he informs me about university, community, and professional resources. She/he helps me make contacts or appointments when necessary.

- My adviser treats me in a professional manner. She/he creates a supportive environment and discusses decision-making strategies. She/he gives me her full attention during my visit(s).

- My adviser provides adequate guidance relating to my career goals.

Students are also questioned on their level of satisfaction with their adviser's overall effectiveness using a rating scale.

Responses to open-ended questions are another important part of continuous improvement with advising personnel. To facilitate this, students may also answer open-ended questions, such as the following four that are listed.

1. My adviser has helped me most by …

2. What are the strengths of your adviser?

3. In what areas could your adviser improve?

4. Please provide any additional comments about your adviser or the department's advising service in general.

Advising staff is an important part of the recruitment, retention, and academic team. Professional advisers provide substantial benefits to students in different ways than do faculty advisors. Advising professionals do not replace faculty as disciplinary mentors, but their expertise in student development, curricular policy, and working with high-risk students has proven valuable in a high enrollment engineering and technology department. When professional advisers manage the curricular and developmental components of advising, it frees the faculty to focus on what they do best: serve as disciplinary mentors for students (Baker & Griffin, 2010). The department envisions academic advising as a continuous team effort, and the use of professional advisers facilitate this approach.

Future Research Directions

There is a lot that researchers do not know about students who transfer from the "E" to the "T" of STEM, particularly related to success factors and effective predictors of their successful integration into the new field. Differences in the learning styles of engineering and technology students are not well explored in the research literature (Asunda, et al., 2015). Also, specific information on how faculty and advising staff build or re-build the efficacy of students who have had previous academic setbacks in engineering have had little emphasis in published literature.

An emerging field of research has explored best practices for advising STEM students (Haag, Hubele, Garcia, & McBeath, 2007; Meyer & Marx, 2014). Yet, little research exists on specific practices to best serve students transferring from one STEM field to another. Additionally, methods of establishing or re-establishing efficacy for students in the "new" discipline have not received great attention in published literature. Internal data from the author's academic department suggest that technology students differ from engineering students in how they learn, how they approach problem solving and critical thinking, and how they establish their disciplinary expertise. Furthermore, factors that influence the success of students who transfer into technology from engineering have not been examined in the literature. One factor hypothesized to influence a successful transfer is *effective academic advising*. Addressing these factors through empirical research is critical for the discipline and for the future of engineering and technology academic programs at both the undergraduate and graduate level.

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