Qualitative Inquiry that Counts
Rethinking Why Students Leave Engineering

Elaine R. Borrelli
The University of New Mexico

Abstract
The questions we ask students about why they stay or leave college are framed from well-researched retention theories. Not surprisingly, our surveys support the answers we expect to hear. Students report the need for more mentoring, study-groups, and classroom support. But the ‘frame’ of these questions is misaligned with how the college student actually experiences his/her education. Educational research tends to define the unit of analysis of the student as part of the higher education system vis-à-vis their classes, their use of resources, their GPA, their interaction with faculty, etc. From my research, I have discovered that the unit of analysis is the student as a part of their family system. Further, my research indicates that family influences appear to be the dominant social membership identity that students construct to explain their college choices and degree plans. This distinction is critical to understanding and rethinking why students who are in good academic standing continue to leave engineering majors.

Many of us share a research assumption that student retention is about improving university life, including the quality of instruction, the size of the library, and even the success of the football team. More research should be directed to the linkage between the family unit and the student’s decision-making as it impacts engineering degree persistence. In many ways, this may be a thorny issue. However, a systems theory approach will lead us to an understanding of how people, resources, and processes come together during a student’s college experience.

1 Introduction:

Theoretical grounding of systems

Peter Senge introduced the concept of systems thinking in his seminal work, The Fifth Discipline. Systems thinking is the first of five theoretical constructs that form the foundation of his advancement of a new, integrated theory of organizational learning. Organizational learning offers a way to harness individual cognition and learning to facilitate the organization-wide learning and improve the ability to adapt, change and grow. Systems thinking is multi-dimensional (all individuals in an organization) and multi-directional: information or knowledge flows up, down, and around. For complex problems, systems thinking offers “a discipline for seeing the ‘structures’ that underlie complex situations” which is “concerned with a shift of mind from seeing parts to seeing wholes” (p 69).
About the same time that Senge was investigating systems in organizations, a corollary body of research was unfolding in the family and counseling literature that advances the notion of family systems theory. Bowen suggested that family structures are complex systems that exist within and in relationship to the larger social system. The glue that binds and shapes the family system is the multigenerational process, which imparts values and norms with profound emotional meaning and depth.

Kerr and Bowen explained how the embedded values and attitudes are transmitted: "The multigenerational emotional process is enclosed in the emotional system and includes emotions, feelings, and subjectively determined attitudes, values, and beliefs that are transmitted from one generation to the next" Kerr and Bowen (p 224). Larson and Wilson investigated the usefulness of Bowenian family systems theory on career decision making by college students. They offered findings that suggest that ‘fused families’ may sharply limit the career decision-making of children and the child may either revolt against or meekly accept these attitudes and preferences. They also discovered that when anxiety is evident in individual family members or in the family processes, the offspring are unsure about making career decision. This environment “negatively influences the young adult developmental tasks of career decision making, a process requiring more of a balance of intellectual and emotional functioning” Larson and Wilson (p 6).

Student retention theories

Theories on retention of college students have been postulated and refined over the past twenty years. Vincent Tinto’s ground-breaking work forms the basis for most subsequent research. His theory offers guidance to universities on how they can change the campus environment to help students make a solid transition into college life. Retention activities are strategies to integrate the students into the institution. Students are offered more social activities, mentoring, community and service-learning projects, and academic support. Recently, the introduction of learning communities has been identified as helping students connect to peers in small groups in which they may share dorm rooms and take common courses. All of these approaches serve to both welcome and connect the student to the larger college community. The assumption is that if students are smoothly assimilated they will perform well academically and join the community of learners with eagerness and vitality.

Recent rejoinders to Tinto have called attention to his conceptual framework and suggest that a model that rests squarely on the processes and interactions of the institution and the student may fail to see the whole individual or recognize the context in which the student experiences his or her college education. Braxton, Sullivan and Johnson presented a substantial review of Tinto’s model in a manner that questions the assumptions about identity formation as framed through assimilation and integration retention theories. These and subsequent researchers are drawing attention to the research frame or lens through which we view college student retention. Debate is emerging concerning the validity of the interactional system between students and institutions as the sole determinant to understand student persistence and retention.
Retention practices in Engineering colleges.

Colleges of Engineering are particularly alarmed about the high rate in which students leave academic majors in engineering in favor of other degree programs. Special programs and innovative curricula enhancements have been offered to address the loss of students and develop stronger ties that connect students to their Engineering faculty and departments. These include worthwhile programs for under-represented students such as women and specific ethnic and racial backgrounds. Engineering colleges provide special summer programs to students who would otherwise start college without sufficient academic preparation. During the semester, academic tutoring and study groups are plentiful. Other co-curricular activities enrich and strengthen the bonds and interaction between the student and faculty and staff. These range from specialized engineering career planning, student chapters of the engineering professional associations, and mentoring from alumni and upper-class members. Curricula changes have been particularly responsive to creating a more student-centered learning environment through active-learning and employing learning style inventories to better match the learning needs of students. Introduction to engineering courses for first-year students have become more dynamic and hands-on. All these efforts have merit in building genuine connections with students.

While these specialized services have garnered broad-based support, it appears that the drain of students in engineering continues. We are at a crossroads. One approach is to add layer upon layer of new services while continuing to re-tool the curricula. All of which represent a ‘fix-it’ approach to the problem. It may make sense to step back and take a look at the problem of student retention in engineering from another research frame and employ different tools to understand what we are seeing.

A noteworthy effort has been undertaken by the National Science Foundations’s Model Institutions for Excellence (MIE) Initiative to address the problem of low retention and graduation rates for students from our nation’s ‘new majority’. NSF identified six universities that have solid experience in graduating students from Hispanic, Black and Native American heritages and asked these academic institutions to undertake a reform in the content and quality of education offered for science, engineering, and technology students. Although the program is specifically intended to increase the number of students from traditionally underrepresented groups to pursue engineering and the science degree programs, significant knowledge building is occurring to help aid engineering educators understand the importance of the learning environment and the need to facilitate interaction between students and with faculty in substantive ways. The MIE Initiative is spearheading institutional change that meets the needs for students to form close connections with their peers, the faculty and the campus. Central to these programs is a holistic approach to the student as learner, undergraduate researcher, peer tutor, and mentor. At the University of Texas-El Paso, the CircLES Program provides a supportive structure that expands the learning environment outside of the classroom while students work in teams with professors and classmates. This approach has already merited success in higher retention and grade point averages for students.

AT Xavier University in New Orleans, the MIE Program has developed “Triple S - Standards with Sympathy in the Sciences”. Triple S is a coordinated effort by the mathematics
and science faculty at Xavier to structure basic courses in a way that will simultaneously maintain high academic standards and provide extensive support for the under prepared student.

Bowie State University in Maryland has taken seriously the challenge to be an Institution of Excellence in all facets of university life. They have initiated assistantships programs and undergraduate research, provided improvement to their science facilities, reached out to high school science and math coordinators to encourage more high schools to enroll at Bowie and major in science and math. Their motto “Just as it takes an entire village to raise a single child, it takes an entire University to educate a student” is manifested in their team orientated approach. Characteristic of attributes of learning organizations, Bowie looks at the institution as a whole and develops ways to create opportunities for collaboration that includes their students and community stakeholders. A goal is to create an environment for collaboration that builds a team and culture around a shared vision that strengthens and binds. Similar efforts have been undertaken at The Universidad Metropolitana Puerta Rica, Spelman College in Atlanta, and Oglala Lakota College in South Dakota.

This research projects shares a similar research frame as the NSF Model Institutions for Excellence Initiative by looking at the student experience in a wider context.

Program Description:

Qualitative inquiry

This research was undertaken to gain a richer understanding of why students who are performing academically well continue to leave engineering majors because it appears that current retention activities do not appear to keep these students. At my university, the retention activities are typical of many others, and range ranging from social activities to study groups, networking opportunities with alumni and upper-classmen, etc.

Retention efforts at the university for engineering students are influenced by Tinto’s model. We focus our attention on building strong connections and multiple of connections to our new students. The weakness is that our approach is linear and assumes a cause and effect relationship between our actions and the student’s decision to stay in the college. We assume that our efforts to provide social and academic integration in the college of engineering is sufficient to retain students, as represented by the following diagram.

Traditional Retention model

Engineering Faculty + Staff ⊴ Retention Activities ⊴ Engineering Students

In trying to grapple with student retention, several sub-issues come to mind. Are students in academic difficulty and that is why they drop out? Are they members from ethnic groups are they women, are they non-traditional (older) students? We tend to look to find pieces to the puzzle and offer a fix to that sub group. We need to find alternate ways to understand the problem and generate more questions concerning student choices and decision-making.

Qualitative research is a process of asking questions, and discovering meaning from the process. Each set of questions creates a rich reservoir of information that leads to the next set of
questions. This represents a formative evaluation of how the findings inform the researcher about the nature of the research. Qualitative inquiry is a strong tool when looking at human behavior and interrelated decisions and actions. This blends nicely with the overlay of systems thinking. At its core, systems’ thinking asks the researcher to make a shift in the research frame. Rather than seeing the student as a part of the university as a system, we ask the student to tell us how they see themselves, what their context is for their academic pursuits, and who influences their choices. Hence we are searching for the students own meaning/understanding of their education.

The scientific method relies upon the extrinsic concepts and categories that have import for scientific observation and measurement. Scientific research is summative and produces end-results that are defined and categorized. The finds may be generalized to other populations and replicated. Qualitative inquiry attempts to unravel distinctions that are meaningful and find patterns of behavior in social context. Qualitative research is often referred to as naturalistic in that it occurs in natural settings and is descriptive and exploratory. The process is subjective as the researcher looks holistically at systems to gain an inside view. Hence the data produced from qualitative research differs from scientific research because it is formative and context bound.

Qualitative research employs techniques to assure trustworthiness and reliability of the research. The following table summarizes how the qualitative researcher examines the process and research question of the study.

<table>
<thead>
<tr>
<th>Qualitative Measure</th>
<th>Scientific Measure</th>
<th>Research Implications</th>
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<tbody>
<tr>
<td>Credibility</td>
<td>Internal validity</td>
<td>Are the results credible from the participants eyes—they are the only ones who can legitimately judge</td>
</tr>
<tr>
<td>Transferability</td>
<td>External validity</td>
<td>Can the research question be used by another researcher who wants to take the results to another context? The researcher must do a thorough job of describing my research context and the assumptions central to my research</td>
</tr>
<tr>
<td>Dependability</td>
<td>Reliability</td>
<td>Describe the ever-changing context of the study and how it affected the way the researcher approached the study</td>
</tr>
<tr>
<td>Conformability</td>
<td>Objectivity</td>
<td>Checking + rechecking the study. Look for negative instances to disprove your observations or conclusions.</td>
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This research employs triangulation to get a fuller picture of how the students experience their education. Triangulation allows the researcher to gather data from various sources to get a better understanding of the problem and to authenticate the data from different experiences and persons. Students were interviewed, academic advisors were interviewed, and the student’s academic record and department file were examined to look for patterns and trends. The students
were selected because they had indicated that they wanted to change their major from engineering. Triangulation tests the consistency of findings obtained through different types of data observation. Triangulation increases the chances to control, or at least assess, what’s going on (themes, influences, relationships) in terms of the threads or multiple causes influencing results.

Students are primary sources for their education. Surveys are traditionally employed to gather data that can be sorted and analyzed for large groups of students. Personal interviews with students take longer and are not value-neutral – i.e., is the researcher as interviewer is part of the data. They ask the questions, they probe for deeper understanding, they re-word questions, they ask for clarifications, they interpret the student as a whole person during the interview. Another important source of data about why a student leaves is consulting with their academic advisor. The academic advisor meets with students and often must discuss the student’s academic degree progress in terms of the student’s life. Students talk to their faculty and academic advisors about demands from part-time jobs, health issues, roommate problems, lost or stolen textbooks, and the like. A third source of valid information about the student is their academic record. The student’s academic transcript provides an accurate record of how the student performed. A companion to the academic transcript is the student’s folder. The student’s folder may contain copies of honor roll letters, scholarship awards, and notes and referrals from his/her advisor.

Data

Shortcomings and limitations: The sample size is small. Four students were interviewed. The students were identified to the researcher as part of an effort to find out why students had changed their academic college. These specific students were identified from a pool of students who were not in academic difficulty and yet had changed their major and left the Engineering College. Out of a pool of four students who were contacted, four agreed to come in for an interview.

Student Interviews:

Parental Influences:

Students were told that I wanted to speak with them about their educational plans. During all four interviews, the topic of attending college and choosing an engineering degree was explored. When asked to describe how they made a decision about their academic degree, three of the students relayed conversations they had with their parents. One student talked about a variety of factors that related to his part-time job. These conversations seemed to take place over time. That is, these were not one-time or isolated discussions around the topic of where do you want to go to college and what do you want to study. Students seemed to compact discussions and interactions that they had with their parents: for example:

“I spent the first couple of years at college, not sure what I wanted to take or do. I think it’s better for me to be at home with my folks than going to college …. help my focus”

“Since middle school … my parents encouraged summer programs and every after-school activity…. I was always told that…..you’re smart don’t waste it”

“My parents want me to be happy”
I was surprised that students relayed the influence of their parents to me. I know all students are influenced and shaped by those people who are closest to them, however, I did not think they would make so many references to their parents in different aspects of their college experiences. I expected college students would want to be or pretend to be independent of their parents and would not acknowledge that relationship with their parents as being so important to them and how they make sense of their college.

Graduating quickly: All four students mentioned that they needed to graduate quickly – that they just wanted to get out.

“I need to graduate in three and a half years …my dad went to college here …”

“This is my third college, I got to finish soon …”

“I can get all A’s if I do business and graduate in three years.”

“I’ve jumped around a lot …need to do something …finish this… graduate”

I was not surprised by these comments. Students have a great sense of urgency to graduate. I believe this relates to them achieving a milestone and this may intersect with their parents’ expectations. This theme needs to be explored in subsequent research.

Advisor Interviews

I interviewed two academic advisors (Angela and Monica) who work with these students to obtain their understanding of why successful students leave engineering.

Family theme. Within the first five minute of the interview, Angela started talking about her students as they face “huge life issues”. She was referring to older students who return to school. She described their return to the university as

“Typical a decision made with the family . . .
all the family members involved . . .”

She immediately compared this to another group of students who are beginning freshmen.

“They think they have a targeted place to go . . .
is it from the parents’ perspective . . . is it parents . . . influence . . . is it theirs?”

Monica also talked about the influence of others on the students early on in the interview, but she was less specific about which people when she said.

“. . . strongest influence is what they heard from
other people . . .”

Angela relayed a couple of her experiences with students. She gave an example of a student she advised who was

“. . . wavering between engineering and life science degree”

She put him in contact with people to give him more information about the various degrees and also referred him to web sites and professional engineers.
About two-thirds of the way into the interview Monica started to talk about why some students change their degree plans from engineering. It is at that point that she mentions a variety of spheres of influences on the student including the family.

“… its been building up for several months to change …. (I tell them to ) go to career services, do career inventory, talk with faculty, other students in the major. Talk with their family because maybe there is something going on there.”

Angela also talked about how she referred students to other campus resources to help them make degree choices and career plans.

“… the student has to be ready to use resources… I can tell them . . . career counselor, career inventory, have you looked at ….”

Document Review

Advisement Forms and Student File Folder

The student file folders were rich with information. I tracked how the advisor interacted with the student, how they reviewed the student’s academic progress, and how they reacted to the student’s decision to change their major from engineering. Monica’s notes seemed to emphasize what the student needs to do to change their major. She would provide names of advisors in other colleges/majors for the student to contact. She also would contact those advisors to follow-up on the students. This appeared to be consistent with my interview with her. She seemed to believe that if students want to make a choice to change their major that it may be a personal or internal motivation. Maybe they are not happy with the courses, or the courses are not what they expected.

It seemed that she was willing to help the students transition to a new career field more quickly than her co-worker Angela. Angela’s notes conveyed the impression that students needed to find out if this next major was in fact the best fit. She repeatedly reinforced that students should not make a decision before doing some career exploration through the use of career services and interviewing professionals in the chosen field.

Both academic advisors reviewed the new major with the student and identified admission criteria that the student would need to satisfy to change majors. This may include required courses or application deadlines.

During the first advisement session, both academic advisors made extensive comments regarding transfer work (if applicable) and the students interests, skills and plans.

All students were referred to faculty, undergraduate research opportunities, engineering student groups, and various support programs or career services. It is significant that none of the four students utilized any of these resources to help them decide on whether to remain in engineering or change their major.
Case Study Summaries based upon review of academic record, advisement forms and student folder

Anna was originally interested in Mechanical Engineering and indicated that she may want to work in the bio-mechanical or robotic field. During her first semester, Anna did extremely well and was placed on the School’s Honor Roll list. She is from a local area high school and was living at home with her parents. Anna visited with her academic advisor four times over a period of 9 months. Anna is the second oldest child in a well-established Hispanic family in New Mexico. She graduated from a public high school in the city and enrolled at the University immediately after high school.

During her first contact, she indicted displeasure that she was not eligible to enroll in Calculus I due to her ACT Math Score. She was referred to the Testing Office to take a Math Placement test to see if she would be able to place into a higher Math class. It appears that she did not go to the Testing Office and take the test as was suggested. On subsequent visits, she indicated uncertainty about her degree program in engineering and was referred to consult with academic advisors in the Colleges of Business and Arts and Sciences. It does seem that she did visit the College of Arts of Science to inquire about health science and pre-med options. During one meeting, Anna conveyed her sense of isolation at the university. A discussion evolved about her friends and classmates at the University. Anna indicated that she did have friends from her high school that were at the university but they were not in similar classes. She was provided information about student groups in the School of Engineering and contact names. It was emphasized that she needed to find some people that she could connect with and socialize with that have her same interests. She was familiar with the programs and activities of the Diversity Office in the School and had participated in one or two of those activities. During conversations with her academic advisor she expressed her desire to do well in college at the same level of performance of high school. It appears that she wanted to maintain a GPA of at least 3.50 and that a high GPA was more important to her that the actual courses that she was enrolled in. She indicated an interest in Biology, and consequently transferred out of the School of Engineering after four semesters. At the time of transfer, she had a cumulative GPA of 3.23 and had completed most of her preparatory math and science coursework for her engineering degree with good grades (ranging from C to B+)

Sandy is from a smaller town in New Mexico. Sandy is a Caucasian female who attended an out-of-state private university immediately after high school. Sandy started out at this university as a beginning freshman. Her first semester was extremely impressive; she earned a 4.00 cumulative GPA on 15 credit hours. She seemed to be on track and motivated for her second semester. Her advisor made the following notations:

“Schedule discussed. Workload heavy but Sandy feels prepared. She may lower her workload (part-time job) if she feels she needs to”

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She returned to New Mexico and worked for a while before enrolling at the University. She was living in an apartment with friends and indicated that her parents were providing her some financial support but she still needed to work part-time. Sandy was eager to return to school her first semester, but did need to withdraw from one of classes due to low grades. She visited with her academic advisor five times over a period of eight months. Sandy had indicated an interest in Electrical Engineering and was provided the name, phone #, and email address of a faculty member to discuss her plans. She was also given contact information relative to Mechanical Engineering since she discussed an interest in Aeronautics and NASA. The School’s Mechanical Engineering Department has two faculty members with space/aeronautics backgrounds. She was also encouraged to attend the meetings of the student chapter of the American Institute of Aeronautics Engineers. Discussion seemed to be focused on her desire to complete her undergraduate degree rapidly. She expressed concern that she had been in and out of school and wanted to find something in which she could settle. Of all the students that were case studies, Sandy appears to have the strongest academic background from her private high school, where she had taken Honors courses in Math and Sciences. She seemed to be able to handle the university level courses very well as evidenced by her cumulative GPA of 3.74 in courses that are directly related to her engineering major. She did not enroll in “fluff” courses.

On one occasion a discussion with her advisor ventured into her involvement on campus with other students. She did not think that it was important for her because she is felt that she was smart and could do the courses. The advisor did recommend that there are benefits to participation in support programs and student groups. She was provided information about the student chapter of the Society of Women Engineers and their activities around team building, mentoring, network and social outings. Sandy left the School of Engineering after three semesters. She had already been admitted to the Electrical Engineering Department due to her completion of all her pre-requisites. She is pursuing a degree in Business Management.

Mike attended two different colleges before enrolling at the University of New Mexico. He attended a 4-year out-of-state public university right after high school and then enrolled at in-state 2-year college. Mike was working part-time and attending school part-time to full-time. He did very well his first two semesters at UNM, but some of the classes were repeats from his previous college. He had three contacts with his academic advisor over 10 months. The trend with Mike’s consultation with his advisor appears to be that he wanted to receive a degree that helped him prepare for a job in sophisticated modeling or graphics. He was referred to a faculty advisor in computer science, was his original interest, to see if there were elective courses that might provide him this knowledge. Mike apparently enjoys and excels in Physics and was offered an undergraduate research position with a Physics faculty member for a summer, which was a positive experience. He started to think that he may change his major to Physics but was concerned about job prospects with only a Physics undergraduate degree. At that point of time, he was provided the contact person in the career services and co-op office to discuss careers and the job market. It appears that Mike is still pursuing a computer science degree. He currently enrolls in two to three classes a semester and takes some non-computer science classes in art and drawing. His cumulative GPA is high at 3.81.
Denny is a Caucasian male. He enrolled at the University of New Mexico as a second choice. He was attending an out-of-state university for one semester and majoring in civil engineering. He relayed that he came back home because his father had an illness. Also, finances required him to be home and attend the local university because his mother works at the university. Denny was able to rollover a scholarship from a local civic group to this university. His grades at his first college were C+ and B’s. He indicated an interest in civil engineering and discussed jobs in the construction and architecture fields. He visited his academic advisor four times over a period of eleven months. Denny is living at home with his parents and attended a local public high school. He was referred to campus resources for study groups and tutoring because he was having difficulty in Calculus II. He did stay in the class and passed it with a B. He indicated repeatedly that he wanted to do research and he was provided contact information concerning undergraduate research opportunities across campus and within the School because there are several research projects that hire students. Apparently, he followed up on these leads and later he was working a few hours a week on campus in a lab. It appears that Denny’s experiences with his father’s medical services have had a tremendous impact on him. He wants to look at how he can assist others with medical conditions like his dad. More and more, it seems that he is interested in a career in medicine. Denny stated that many things were difficult for his mom and younger siblings because his dad’s health is up and down. As the oldest child he wanted to be there for them. Denny left the School of Engineering with a cumulative GPA of 3.49 and returned to the general college for undecided students at the university. At the time of his last advisement appointment, he mentioned that he was interested in pre-med academic track.
Discussion and future research

This research represents an initial effort to understand why successful engineering students leave engineering majors through a non-traditional methodology that seeks to find meaningful information to (1) inform the researcher about the nature of the problem; and (2) guide the researcher in possible themes for subsequent research.

Interviews with the students were a good source of information to test out how students will respond to someone asking them how they made a decision about their degree program and switching their intended major. Students do not disclose this information easily or in a straightforward manner. This may be the first time that someone asked them to consider how they make decisions and what factors are important to them in the decision-making process. Listening to how they framed their answers was as important as their actual responses to direct questions. On some occasions, it was clear that they were thinking aloud and constructing an understanding of the decision during the course of the interview. I was surprised to hear that students did not follow through with recommendations to talk with their professors, consult with career services or even do some on-line research before they opted out of engineering. All of them knew about the resources but did not feel it was important to use this information to help them to arrive at a decision about leaving engineering. I asked two of them in a direct manner if they met with the professor who was recommended by their academic advisor and they said “No”.

Students appear to value graduating on time and earning high grades. Two of the students indicated that they were honor students in high school and that they had to work harder at the university to earn high grades in the engineering, science, and mathematics courses. There was a consistent concern expressed about graduating on time. These were students who were still in their first two years of their engineering courses. Taking more than four years to finish their undergraduate degree was not agreeable to them even though they knew that many engineering students do balance their course load over five or six years in order to get through the tougher engineering classes or to participate in an engineering cooperative education placement.

The interviews with the two academic advisors was particularly rewarding. I was impressed by the way they could relay their experiences with specific students and offer their impression about the way that all students make decisions concerning their academic major and decision to leave engineering. These academic advisors have a closer relationship and multiple contacts with their advisees and build a relationship with them. It appeared that they were able to provide me a deeper understanding of these students and other students because of this relationship. As an interviewer-researcher, I had only one contact with these students. The academic advisors indicated quite strongly that the family or parents are very influential for students. The academic advisors provide a number of retention activities for students and reminded the students of these programs repeatedly.

The document review conducted of the student file folder contained a rich historical record showing how each student was provided phone numbers and emails for faculty, flyers concerning tutoring, information for mentoring, and other activities in the college. It was clear
that the conversation about changing a major produced many notes by the academic advisor concerning their contacts with the students and their efforts to help the student.

Understanding student choices is not easy. Students may perform well in their courses, attend study groups, and participate in social activities, but they may not consider institutional supports to be their own personal support system. The values and messages that they receive from their family may be so important to them that they choose to ignore or disregard factual information that the university attempts to convey. For example, if a student’s dad has told the student that he graduated with a degree in a certain amount of time, the student may feel that it is more important to reach the endpoint (earning a degree) and less important if this a degree that represents value to the student. Future research is needed to investigate how parents see their own role in their child’s college education. We do not know how parents understand their influence. Would parents be more successful if they asked their child to do some career exploration before they changed their major? There is also the issue about graduating in a timely manner. We do not know if this is because the parents have indicted a financial reason to the student or if the student has a sense of urgency to finish college. In subsequent research, this theme can be explored more deeply.

Equally important is to consider how higher education’s efforts to develop learning communities for students may assist students bring together the importance of their family life and their new connections with classmates and university life. Myrna Smith (8) offers a unique underpinning to the mission of teaching and learning. She indicates that faculty has a special obligation and duty to develop a spirit in the classes they teach and thus become more effective teachers. She defines “spirit” as "the breath of life" that brings students to a better understanding of themselves and the content of the course. She offers suggestions where faculty can build a sense of community in their classrooms and facilitate opportunities for cooperative learning through group work called positive interdependence, where students work in groups but are still individually accountable for their own piece of the assignment and receive a grade for their work.

Another good area for rich research is to examine the experiences of students enrolled at the NSF Model Institutions for Excellence Initiative. We could learn a lot about how these special programs build a system of contacts and connections that reflect the strengths and values of families.

Bibliography

3 Connections: Quarterly Newsletter for the Model Institutions for Excellence Initiative at the University of Texas at El Pas (Winter 2001)
Biographical Sketch

Elaine Borrelli is the Director of Engineering Student Programs at the University of New Mexico. She serves as the Geographic Representative to the National Academic Advisors Association for the five-state Rocky Mountain Region. She also serves as the Director of the Women in Science and Engineering Program. She is active in research and activities in the theory and philosophy of advising, assessment of advising, and career development for women in SMET. She is a Doctoral Candidate in OLIT.