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THE ROLE OF SIGNALING FROM A STUDENT PERSPECTIVE ON MATH REMEDIATION IN THE TRANSITION FROM HIGH SCHOOL TO COMMUNITY COLLEGES

BY

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DISSERTATION

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Abstract

The purpose of this study is to obtain the perspective of students attending a rural community college in a Midwestern state regarding why they were placed into a remedial algebra course when enrolling directly out of high school. The study uses the concept of signaling to examine how students interpret signals from sources such as counselors, teachers, peers, and policies. Understanding how students use the plethora of signals sent from various sources, including what they discern to be signals, may help community colleges address the growing problem of remediation. This study has implications for K-12 and higher education by shedding light on the information students use to prepare for college.
To my son Samuel and my daughter Misty who are my heart,
    To my husband Mark who encouraged me,
    To my sister and family who supported me,
    To my heavenly cheerleaders who watch over me.
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Chapter 1

The Problem

How do high school students make decisions about college preparation? To whom do they listen, and how do they process all the college information that is sent their way? The transition from high school to college is a much-studied phenomenon (Boswell, 2000; Bueschel, 2003; Cabrera & La Nasa, 2000; Conley, 2007; Kirst & Bracco 2004; Kirst & Venezia, 2004; Nunley, Shartle-Galotto, & Smith, 2000; Terenzini et al., 1994), but more needs to be known about the growing number of students who are testing into remediation (McClenny, 2009). If the way students assimilate information about college preparation can be better understood, students can be sent more deliberate signals that can help them prepare for and complete college. The concept of signaling is used in this study to provide a lens through which to study the way high school students think about community college preparation.

Provasnik and Planty (2008) conducted a national survey of postsecondary students in 2003–2004 and found that 29% of students enrolled in community colleges reported taking some type of remedial coursework in their first year. The most common remedial course for all beginning postsecondary students was math, with 22% of beginning community college students taking remedial math. In a survey conducted by the Conference Board of Mathematical Sciences, Lutzer, Rodi, Kirkman, and Maxwell (2007) found that approximately 57% of the 2-year college mathematics enrollment in the fall of 2005 was in precollege or remedial courses, and the nation had seen a 21% increase in remedial math enrollment in 2-year colleges from 1995 to 2005. This increase in remedial math enrollment within a 5-year period sends a warning signal that math preparation for high school students is failing.
Between 1972 and 1997, the rate at which high school completers enrolled in college in the fall immediately after high school increased from 49 to 67%. Since that time, the rate has fluctuated from 62 to 69% (Planty et al., 2008). The growth in community college enrollment has increased five-fold since 1965 as compared with the growth in 4-year institutions, which has doubled in that same period (Rosenbaum, Deil-Amen, & Person, 2006). In the fall of 2009, 29% of full-time students attended public 2-year institutions, the most recent date national enrollment figures were available (Aud et al., 2011).

Community colleges have the largest responsibility for remediation, often because of state policy and because they are open-admission institutions serving large numbers of low-income, minority, and academically underprepared students (Greene, 2008). The comprehensive mission of community colleges, combined with the open-door policy, provides access (Cohen & Brawer, 2008) and contributes to the growing number of students who enroll in these institutions (Greene). Community colleges are often the institutions of choice for students finishing high school who are uncertain of their college pursuits and who lack a college preparatory background (Kirst & Venezia, 2004; Rosenbaum, 2001). This mission beckons to first-generation college students and their parents that college is a viable option, planting the seed that a college education and upward mobility are indeed possibilities. However, Rosenbaum (2001) believed the pervasive “college for all” (p. 3) philosophy espoused by community colleges and touted by high school counselors misleads students. He argued, “Second chances are a fundamental American tenet. However, open-admission policies and remedial programs inadvertently convey to students that high school is irrelevant and that there are no penalties for poor effort” (p. 3). Rosenbaum goes on to speculate that students may not perform to their full potential because they know they have the safety net of entrance to a community college. There is empirical
evidence to support Rosenbaum’s claim. A list of “Ten Myths That Students Believe About College” (Kirst & Venezia, 2004), in which students verbalize their perceptions of college preparation, includes five myths, stated in the first person from the perspective of a student, that are especially pertinent to this study:

1. Meeting high school graduation requirements will prepare me for college.
2. Community colleges don’t have academic standards.
3. It’s better to take easier classes in high school and get better grades.
4. My senior year in high school doesn’t matter.
5. I can take whatever classes I want when I get to college. (p. 295)

In addition, students do not take advantage of activities and information that are designed to assist them. Kirst and Venezia found that 25% of the students they interviewed as part of the Bridge Project, a research and policy initiative conducted by scholars at Stanford University, indicated they had not participated in college preparation activities such as attending a college night, nor had they taken the ACT or SAT.

Along with the pursuit of a college degree, the realization that the academic skills required by colleges are not in alignment with the curriculum of most high schools has become apparent (Kirst & Venezia, 2004; Merchant, 2004; Venezia, Kirst, & Antonio, 2003). This finding runs counter to the expectations of the public, including parents and students. Specifically, it seems logical that parents and students would assume that when a high school diploma is awarded, the recipient has acquired the skills to pursue a college education. However, this assumption is not a safe one because a high school diploma does not necessarily entitle a graduate to begin college without first completing remedial courses (Bueschel, 2003; Rosenbaum, 2001).
Remedial education offered by community colleges typically refers to the areas of reading, math, and English (Roueche & Roueche, 1999). The term remedial education is used interchangeably with developmental education in much of the literature. However, the term developmental is more acceptable to students and avoids assigning them a remedial label in their first college experience (Casazza & Silverman, 1996). Consistent with this definition, the motto of the National Association for Developmental Education (2006) is prominently displayed on their website (http://www.nade.net/aboutnade.html) as helping “underprepared students prepare, prepared students advance, and advanced students excel.”

Grubb (1999) defined remedial education as “a class or activity intended to meet the needs of students who initially do not have the skills, experience or orientation necessary to perform at a level that the institutions or instructors recognize as ‘regular’ for those students” (p. 174). In Grubb’s analysis, remedial education is about filling a gap rather than promoting development along a continuum from beginning to advanced student.

Bailey, Jeong, and Cho (2008) used data from Lumina Foundation for Education’s Achieving the Dream initiative to categorize remedial math as (a) one level below the entry-level college course; (b) two levels below; and (c) three or more levels below. Their schema suggests remedial math in community colleges falls into one of three categories: (a) basic math, (b) beginning algebra, or (c) intermediate algebra. Similarly, Merisotis and Phipps (2000) noted that many community colleges require multiple levels of mandatory remedial course work before students can enter a college-level math course, and no remedial math courses count toward a degree.

Upon entering college, many high school students find they must complete remediation before registering for college-level courses, particularly students who opted out of the college
preparatory curriculum at the K-12 level (Kirst & Venezia, 2004). This news is delivered to the students after they have taken a college placement exam, which is a test that determines a student’s skill level in reading, math, and English. Analysis of the postsecondary transcripts of 1,992 twelfth graders who attended college between 1992 and 2000 revealed a 61% rate of remediation for public 2-year attendance and a 25% rate for 4-year institutions (Wirt et al., 2004). For students who lack adequate preparation to enter selective colleges and universities, the community college is the preferred higher education institution to transition to the postsecondary level.

Several factors contribute to the increasing remediation among high school graduates, but three stand out as particularly important to the transition of students from K-12 to postsecondary education (Kirst & Venezia, 2004). These factors are (a) admissions, (b) first-year college placement or advising, and (c) the state-level impact on K-12 and postsecondary education. Kirst and Venezia theorized that policy signals and incentives, or the lack thereof, play a major role in the decision-making process of high school students preparing for college. In a study of the alignment between policy and curriculum in six states, two states (California and Maryland), demonstrated a lack of alignment of the math curriculum. To bridge this alignment gap, two California community colleges devoted approximately 33% of their math schedule to remedial offerings. In Maryland, the campus of Rockville College reported that 63% of high school graduates required remediation in math, whereas 44% of graduates from an incoming high school needed remediation in math in another Maryland community college.

Based on the results of a subsidiary study within the Bridge Project, Bueschel (2003) tied remediation in math, reading, and English to curriculum alignment and college preparedness.
She suggested that students receive signals about their readiness and expectations for college, but little is known about these signals:

More needs to be known about the signals sent to students about the expectations and requirements for entering community college. While the message that two-year institutions welcome everyone seems to be coming through clearly, there is a far dimmer signal about college-level expectations. (p. 281)

Bueschel identified communication between community colleges and high schools as an area that warrants more research. She commented further,

Despite a decrease in the skills and abilities of many entering students, aspiration to transfer remains high. Students need to understand not only what it takes to succeed in transfer, but that basic skills in literacy and numeracy are necessary for occupational and vocational programs too. (p. 281)

However, the problem is more than issues with communication between the two educational entities; it is also related to how students think about college preparation and what signals influence their decisions.

The literature on students’ college preparation is set in the context of urban and suburban community colleges. Several of the studies referenced in the literature were conducted in urban and suburban communities or large rural institutions (Kirst & Venezia, 2004; Rosenbaum, 2001). For example, Bueschel (2003) reported findings on students living in urban areas, including Sacramento, Baltimore, and Portland. Although these studies are insightful and highly informative, the inclusion of community colleges located in rural areas with smaller enrollments would add depth to the current understanding of how signaling influences the students who transition from small, rural high schools to community colleges.

Rural community colleges are prevalent among community colleges in the United States. They constitute 59% of all community college campuses in the United States and 34% of the national community college enrollment, but they are not distributed equally throughout all
regions of the country (Hardy, 2005). The majority of rural campuses (72%) are located in two regions, the north central and southern accrediting regions (Hardy). Moreover, the demographics of students in rural community colleges differ from the demographics of students in other types of schools. For example, Illinois is one of the states in the north central region, and community college student demographics show that a greater percentage of rural community college students are White (74%), compared with urban (45%) and suburban (54%) community college students (Hardy & Katsinas, 2007). However, Hardy and Katsinas contended that there is more viability within the rural category than within the urban and suburban categories, which has implications for policy and practice.

To their credit, rural community colleges provide those in their service areas with social and cultural opportunities (American Association of Community Colleges, 1992): “They are often the center for rural community and economic development and the primary catalyst for improving the quality of rural life” (p. 6). Valadez and Killacky (1995) observed that rural community colleges are uniquely positioned to serve in a leadership role to address literacy, poverty, and education. However, Roessler (2006) found that rural community colleges are less likely to offer a variety of educational programs and student services compared with community colleges in urban and suburban locations, and they rely more heavily on state support because of having a higher cost per student.

Local, state, and national policymakers can benefit from examining the differences and similarities between rural community colleges and urban and suburban institutions (Hardy & Katsinas, 2007). According to the Rural Community College Alliance (Sparks, 2009), rural community colleges are often isolated from peer institutions, have low exposure to cutting-edge ideas, and lack forums that focus on the unique challenges that face the rural college and its
community. Hardy and Katsinas recommended that their rural classification of community colleges be utilized to determine the effect that geography has on student services, involvement in workforce and economic development, and the percentage of people who attend college in the service area. Moreover, the authors recommended research on college transition. Referring to transition programs, they suggested, “More [research] is needed to determine the exact nature and scope of these programs and services and the relationship between their quality and comprehensiveness and the characteristics of the institution’s service area” (p. 354).

Cavan (1995) contended that, in rural communities, the local community college is the only opportunity citizens have for economic development, cultural enrichment, and higher education. Because rural community colleges serve a significant percentage of students who enroll in community colleges nationally and there is a dearth of research on student transition to these institutions, this study was conducted in a rural region of the United States.

**Research Questions**

The purpose of this study is to examine student’s personal reflections on high school experiences that relate to their preparation for college and to investigate the signals that students receive concerning their preparation for college-level math. The study focused on students who were enrolled in Intermediate Algebra (classified as remedial math) by soliciting their reflections on their preparation for college-level math by posing the following questions:

1. What experiences do students identify as relevant to their transition to college and preparation for college-level math?

2. What phenomena do students interpret as signals about their readiness for college-level math, and what is their understanding of how these signals have influenced their college transition?
Signals emanate from a number of sources, and for the purpose of this study, those sources are students’ high school and community college experiences and their exchanges with parents, other family members, and peers. Signals may be clear and easily interpretable, such as verbal recommendations from teachers concerning the students’ readiness to enroll in college-level math, but signals can also be subtle, such as parents’ not saving for their child’s college education, which might lead the student to believe that college is not an option.

Signals can also be positive, mixed, or negative. Positive signals can offer useful information to students, resulting in messages that have an influence on their preparation. Mixed or negative signals can have the opposite effect (Fuhrman & O’Day, 1996) in that they may reduce students’ incentive to prepare for college. In the Bridge Project, Kirst and Bracco (2004) assumed that placement and admissions standards sent signals of expected behavior concerning preparation for college. In the context of students’ preparation for college-level math, early research by Arrow (1973/1984) on how information affects economic behavior showed that signals are elusive and difficult to identify: “It is hard to define the process by which a signal gets to be recognized as such and how the receiver learns to discriminate among them” (p. 144).

**Significance of the Study**

Gateway courses generally include the first college-level English and math courses students are required to take (Clery, 2011). Intermediate Algebra is one level below a gateway math course; students are placed here because of deficiencies, as determined by the COMPASS and other college entrance tests. Bailey et al. (2008) reported that 54 of the 57 community colleges participating in the Achieving the Dream initiative enrolled an average of 50.9% of incoming students in a math course that was one level below college math. They found that
many students did not realize Intermediate Algebra did not apply toward a college degree and had to be completed before they could enroll in an upper-level college-credit math course. Deil-Amen (2011) has also documented this phenomenon and expressed concern about the effect of the lack of transparency that remedial education has on students. These students may not have received signals to help them understand course enrollment.

Because math is a problem area for many high school graduates, it is important to study the problem quantitatively, but it is also important to study it qualitatively. By talking to students and getting their perspectives, it may be possible to gain a better understanding of signals that are sent to them regarding college preparation. The research design for this study called for interviews of students who had entered college and experienced placement into Intermediate Algebra. Focusing on students who were in college allowed them to reflect back on high school from a more mature perspective than if they had been interviewed while still in high school and anticipating what college would be like. A design that allowed students to reflect on their past experiences had the benefit of gathering students’ perceptions after experiencing remedial placement into a remedial math course. Although I do not intend to generalize findings from this small study to a larger population, the results may offer community college personnel insights into how students receive and interpret signals. In addition, the study may encourage K-12 administrators, high school counselors, and high school math instructors to ask themselves why students are not better prepared for college-level math.

Determining the value and importance of signals may help community colleges and high schools evaluate their practices for college recruitment, placement testing, and instruction. For example, if students indicate that they rely on family and friends for advice about college preparation, then colleges may determine that a viable way to reach this population is to reach
out to extended family members to help them understand what it takes to prepare for college. If parents can be apprised of the signals that influence their children’s decisions about college preparation, then they can guide them through a successful transition. However, one small qualitative study should not be the determining factor in what signals are sent to students; instead, the study should be repeated in several different community college settings to see if similar results emerge.

**Limitations**

This qualitative study focused on students, faculty, and administrators in a rural community college setting and, because of the small sampling, should not be considered generalizable to other student populations. Students were recruited for the study voluntarily from Intermediate Algebra classes. However, I did not sense that the students felt compelled to volunteer, and based on the transcripts gathered from the schools, they represented a broad spectrum of abilities in the class, as well as a wide range of diversity and both genders.

Another limitation of the study was the time and budget constraints. Students were unwilling to devote time to more than one intensive interview, and the travel time and time invested by the interviewer were lengthy. Because of the number of students, faculty, and staff interviewed, many trips were required to collect data, and follow-up face-to-face interviews became cost prohibitive.

I purposely chose participants who had graduated from high school and were currently enrolled in Intermediate Algebra. Their perspective was a reflective one and could be influenced by the passing of time and their progressive maturation. It could be argued that they remembered their experience differently after the time lapse.
Chapter 2

Review of Literature

The purpose of this literature review is to examine secondary and postsecondary education in relation to the transition of high school students into community colleges. The problem focuses on students who have recently graduated from high school, have been placed into remedial math, and are currently enrolled in Intermediate Algebra. In an effort to determine why students reach the community college unprepared, the problem is viewed through the concept of signaling. Searches were conducted through ERIC, EBSCO, Dissertation Search, and various other library search engines to locate studies that have identified the signals that college students who place into remediation receive about attending college when they were enrolled in high school and when they transition to college. Descriptors used in the search in a number of combinations were community colleges, high schools, remedial education, higher education, curriculum, placement testing, and transition.

The literature review begins with an introduction to the concept of signaling. Signaling provides a theoretical framework to describe the messages recent high school graduates receive, both positive and negative, regarding attendance at a community college. Because the subject area of college attendance, including community college attendance, is so broad, the focus of this study is limited to students who place into math remediation, and are enrolled in Intermediate Algebra. The strengths and limitations of using signaling as a theoretical perspective for this study are discussed. The use of signaling as a theoretical concept raises the questions of support and the role of communication in the signaling process. Communication is the basis for signaling and is explored to determine its role in the signaling concept. The efficiency of the signal received by the student is largely determined by sense making, which is discussed next.
Alignment and the transition from high school to community college are discussed to analyze their history and role in remediation.

After key concepts are introduced and defined, attention is turned to studies of special import to this investigation. Two studies are reviewed that utilized signaling theory to explore how institutional policies affect high school students who are preparing for college. Next, the chapter presents a discussion of empirical studies on remediation that examines how remediation evolved in higher education and the resulting influence on students who are assigned to those courses. The last section explores math education and remediation and includes an examination of how signals from high schools, community colleges, family members, and peers contribute to math competency levels and the math competencies of graduating high school students.

**Theoretical Framework**

This study investigates the theoretical concept of signaling, which has been used in a number of studies to describe messages being sent in a variety of settings (Kirst & Venezia, 2004; Lee, 2007; Rosenbaum, 2001; Spence, 1973; Zahavi, 1975), but before discussing signaling theory, it is necessary to establish the role of communication.

Models of communication began to recognize and interpret the notion of signals in the 1950s and 1960s. Schram (1965) proposed a model that suggested the receiver determines how the message or signal will be decoded. He contended that the original intent of the message from the sender was shaped by the sender’s field of experience. If the sender did not have a language, background, and culture in common with the receiver, there was little chance the signal would be interpreted as intended. Schram recommended obtaining feedback from the receiver to ascertain how the message had been interpreted and why.
The model of Katz and Lazarsfeld (2005) connected mass communication to the dynamics of personal relationships. Their study gauged the effects of information from the mass media on individuals. They examined political radio and print messages and found that they had very little effect on voters’ decisions. Rather, undecided voters seemed to be influenced more by people such as spouses, friends, and colleagues. The research showed that some people were more influential than others, suggesting that ideas from radio and print influenced certain individuals, and those individuals carried the message to others.

The model by Westley and MacLean (1955) suggested that communication begins when the message is received, rather than when it is sent. A number of modalities, such as sight and sound, may be used to interpret messages. For example, an accident viewed by two individuals may result in totally different reports, based on what those individuals saw. The model indicates that although the sender is communicating several different messages, not all the messages may be received and interpreted by the receiver. If the message is received, it may be interpreted very differently from the message the sender intended.

Berlo (1960) placed emphasis on the idea that communication is a process. His model included the traditional elements of source, message, channel, and receiver, but he added skills, attitudes, knowledge, culture, and social systems because of their importance in the way communication operates. All five senses were also recognized as potential information channels for both the sender and receiver. Berlo stressed the idea that “meanings are in people not in words” (p. 60). In other words, the interpretation of a message depends more on the meaning of words or gestures than on the message itself. Berlo’s contribution reinforced the shift away from models that focused solely on the transmission of information and included the interpretation of information.
Cronk (2005) recognized that social scientists have long understood that signals are designed to target receivers. However, signals are fashioned from ideas that are borne from the perceptions and life experiences of the signaler (Ruben, 1992; Schram, 1965). The reception and interpretation of the signal is filtered by the receiver, who may have a different worldview based on age, socioeconomic status (SES), gender, and a host of other factors. If aspiring employees can use education to signal their competence for a job, then it seems reasonable to transfer that theory to students who are trying to obtain an education. In other words, in the education process, how are students interpreting signals pertaining to their preparation for and transition to college?

Ruben (1992) recognized the complexity of message selection, interpretation, and reception and stated the following:

Message reception is a fundamental aspect of our communication behavior—an aspect to which we often pay little attention. Listening and observing are our primary means for gathering information about the people, events, problems and opportunities in our environment. Listening and observing involve selection. While we attend to and attach importance to some people, circumstances, and objects, we inevitably ignore others. Our selections, interpretations, and memories of messages are subjective and are influenced by what we, personally, bring to the situation, as well as by available messages, sources, media, and environmental influences. Our personal characteristics and previous experiences have a major influence on what we see, hear, understand, believe, and remember. Competence in listening and observing requires conscious effort, an awareness of factors influencing the process, and an understanding of ourselves and our own capabilities, needs, attitudes, values and goals. (pp. 149–150)

On the basis of these findings, the intent of a signal that a person or entity sends may not be interpreted by the receiver with the same meaning as the sender intended. Communication is very complex, and interpretation of a signal is filtered by the life experiences of the receiver. The receiver’s frame of reference is usually very different from that of the sender because of age, gender, SES, ethnicity, and area of residence, to name a few. For example, the perspective on and ultimate decoding of a signal by someone who has grown up in a rural area as compared
with someone who has grown up in the city would be very different. Experience plays a potentially large role in the interpretation the receiver of the signal applies. If the age and education of the sender are very different from those of the receiver, the signal may be misinterpreted or not acknowledged as a signal at all. For example, a community college may target high school juniors as the receivers of admission information by scheduling a “college night.” The juniors (receivers), however, may not see the value of attending the evening meeting and deflect the signal by not attending. The loss of opportunity to receive that information may not be apparent to the juniors (receivers) at that time, or ever.

Communication includes a variety of categories, such as mass communication, new media, interpersonal communication, and political communication (Foreman-Wernet, 2003), but these categories fall short of describing the process that occurs before, during, and after a signal is sent. To craft a signal that is effective in its intent, the sender must understand the receiver not only in terms of ethnicity, gender, SES, and a host of other demographics, but also in terms of how the receiver makes sense of that signal. Dervin and Foreman-Wernet (2003) identified sense making as a step beyond receiver deficits, which posits that an information gap exists that grows wider as technology advances and information increases. Tichenor, Donahue, and Olien (1970) hypothesized that

As the infusion of mass media information into a social system increases, segments of the population with higher socio-economic status tend to acquire this information at a faster rate than lower status segments, so that the gap in knowledge between these segments tends to increase rather than decrease. (pp. 159–160)

According to Dervin (2003), “Sense-making recognizes that people seek information and inform themselves at moments of need” (p. 226). She described the process as follows:

After identifying a need, people rely first on their own cognitive resources. When cognitive resources are found lacking, they reach out to sources that are closest to them in their daily routine. Once useful information is found, they judge it in terms of how it
helped them, not on its credibility. Only when these sources are found to be lacking, do they examine the credibility and expertise of their source or message. (p. 226)

Applying these steps to high school students who are transitioning to college, K-12 and community college educators can begin to understand why students might not listen or pay attention to the signals they are sent by their schools and colleges.

**Signaling**

Signaling was first applied to contexts other than communication when it was researched in the animal world. In those studies, the notion of signaling was used to describe an animal’s way of demonstrating health and vitality to another animal (Zahavi, 1975). Signaling in the animal kingdom was applied in the human world as economists began to look to signaling theory to explain employment selection. The seminal work of Spence (1973) used signaling theory to describe how prospective employees signal their skills to employers through having attained a certain level of education; this theory became known as the job market signaling model. Spence received a Nobel Prize for his theory on the use of signaling to describe how educational level indicates to an employer how well prepared or well trained employees (or job applicants) are to perform the job. The signaling cost to the potential employee is the money spent on education and training as well as the time and effort invested. This cost prohibits many potential employees from completing their education; thus, the value of education remains high. To the employer, education continues to signal proficiency and skill level attainment. The employer establishes criteria for education after experiencing a full round of the hiring cycle. Upon initial hiring, the employer is assuming on blind faith that the education of the new hire is an asset. Once the cycle has been completed and the value of the education has been established, the employer bases wages and hiring on that experience. For example, a potential employee invests time and money
and obtains an associate’s degree in a specialized area. Another potential employee doubles the investment of time and money and obtains a bachelor’s degree. Both have incurred a cost in the attainment of these degrees. Based on past experience, the employer hires the person with the bachelor’s degree because she or he knows that the degree indicates attainment of a higher skill level.

Spence (2001) recognized that other types of signals exist. He used time as an example of a signal of interest in a subject, and subsequently, time had value. The dedication of time by someone in a leadership position is valued at a higher level than time dedicated by a lesser known individual. As an example, Spence pointed out that those in leadership positions who attend an event or function are sending signals of interest and support regardless of the amount of time spent there. The reverse would be true if a leader did not attend the function, signaling a lack of support or enthusiasm. Spence (2001) recognized that education is just one of many signals that exist; education is one signal on a continuum that leads to employment. If this is true, there must be signals on the continuum that lead to the completion of prior levels of education. Why would the notion of signaling be confined to employment? If useful in the context of an employee signaling competencies in the workplace, should this idea not carry over to a student’s progression through an educational system that prepares him or her for employment? If this is so, it is possible that some students receive and use signals in ways that benefit them by preparing them for further education and eventually for employment, and some do not, leaving them behind and causing them to struggle and miss opportunities to prepare for and pursue college.

Although studies applying signaling theory to education are rare, some exist. One especially important study that has relevance to this work, called the Bridge Project, was conducted by Kirst and Venezia (2004). They used signaling in relation to policies related to
admission and placement, and they analyzed how these policies were understood and acted on by students, parents, and secondary school personnel. In the study, they assumed that clear, consistent, and reinforced signals would improve the college literacy and preparation of secondary students. Kirst and Bracco (2004) extended this work to other research projects, noting that signals did not flow to students with a lower SES as readily as they did to students with a higher SES, resulting in more remediation, higher dropout rates, and fewer college graduates among students with a lower SES. Consequently, the conceptual framework for the Bridge Project emphasized collaboration between higher education and K-12 as necessary to reach all students. The results of this highly collaborative partnership between higher education and K-12 were less remediation, fewer dropouts, and an increased college graduation rate for all students. These researchers postulated that without collaboration, policies driven by institutions of higher education, including community colleges, would reach an elite pool of students typically at the higher SES levels. Policies driven by K-12 without collaboration with higher education would negatively influence students with a lower SES, causing them to miss opportunities to prepare for and attend college and leaving them to suffer other detrimental consequences.

The ideal model, according to Kirst and Venezia (2004) and Kirst and Bracco (2004), would be to link up and coordinate administrators at the K-12 and higher education levels in setting policy. In this way, the majority of students would receive opportunities because all students need to receive and understand signals about what is required to prepare for and transition to college. If this model were used, remediation and dropout rates would decrease and college completion rates would increase. Furthermore, this model would not be differentially applied; it would pertain to all students. Collaboration between K-12 and postsecondary
educators would be especially beneficial for disadvantaged students, and honors students would benefit even though their chances of success are already good even without enhanced K-16 cooperation (Kirst & Bracco, 2004).

In another study applying signaling theory to education, Rosenbaum (2001) applied signaling theory to describe how employers select appropriate applicants by using signals to determine human capital. This application of signaling comes closer to that of Spence (2001), although Rosenbaum postulates that the application of signaling begins before a potential employee seeks a job or when an employee demonstrates his or her competencies during the initial phase of employment. Rather, Rosenbaum hypothesizes that education and business linkages are sometimes transparent enough that students’ competencies act as signals before they begin the job search process. He also uses signaling theory to explain how youths know which skills to develop, how to present themselves, and which employers to approach. In many ways, Rosenbaum’s use of signaling is an expansion of Spence’s job market signaling; the focus is on how the job market and potential employees signal one another regarding competence and desirable job market attributes. Rosenbaum expanded Spence’s theory to explore the exchange of signals between the employer and potential employees while students are still actively enrolled in school.

The investigation of signaling in this study includes exploring how students interpret educational policies (K-12 and postsecondary), such as college mandatory placement, especially regarding what college placement in math (remedial vs. college level) means to students once they transition to a community college. Policies play a significant role in the decisions high school students make regarding college attendance; however, educational institutions are sending signals too. If the focus is only on the influence of policies, other influential factors may be
excluded, which would be unfortunate. As high school students prepare to pursue higher education, they may not be cognizant of all the signals that are shaping their decision to attend college. As Dervin and Foreman-Wernet (2003) pointed out, people look to sources that are closest to them first, and rather than referring to policies, they are more likely to consult teachers, counselors, peers, and family members. For example, if students are first generation (i.e., they are the first in their immediate family to attend college), they may or may not receive encouraging signals regarding education (Cabrera & La Nasa, 2000). As another example, a director of a Learning Skills Center at a community college has the power to send signals to students letting them know they are capable of succeeding after completing remedial courses, or they can delay the students’ transition to college-level classes by requiring even more remediation.

Peers have also been noted to play an influential role by signaling that college attendance is either an expectation or a waste of time. The significance of peer pressure is substantiated by Bedsworth, Colby, and Doctor (2006), who concluded that the odds of a student completing college are increased by having a significant number of friends who plan to attend college. Using this expanded view of signaling, I have broadened the interpretation of a signal to include the barrage of signals that influence a recent high school graduate and contribute to his or her placement in math remediation at a community college. A tenet of this conceptual framework is that students who begin their first semester in a community college remedial course have either missed or misinterpreted signals sent in high school that would have helped them be successful in college.

An important emphasis of this study is on how these students processed various signals through their own individual sense making, which is as unique as each student’s individual
experiences. In this study, *sense making* refers to the way in which the receiver makes sense of or interprets signals. If the target audience of the signal could be analyzed, that information could vastly improve the efficacy of the signal. Students in a remedial math course have either misunderstood signals or not received them at all. If educators could understand how students process or make sense of signals, then the signals could be crafted not only to catch their attention, but also to resonate with them once received.

**Alignment and Transition**

A number of authors have studied the transition from high school to college and the working world (see, for example, Koyama, 2006; Ranis, Stein, Cunningham, & Merisotis, 2005; Nunley, Shartle-Galotto, & Smith, 2000; Rosenbaum, 2001). A recurrent theme in this research is that improvements in signals between K-12 and higher education institutions (via communication, collaboration, or information sharing) are crucial to the success of students. Attempts to bridge the two sectors (high schools and postsecondary institutions) are not new and are reported to have occurred as early as 1893, when the Committee of Ten standardized the high school curriculum in response to university concerns about the uneven academic preparation of graduates from newly emerging high schools (Cohen & Brawer, 2003). In certain passages from this important report, if one did not pinpoint the year, the document could be construed as a commentary on the status of education today. Apparently, with the passing of 100 years, Americans still struggle with the preparation of young people to transition from high school to college and ultimately into the world of work.

For a short time in U.S. history, there was a direct connection between high schools and postsecondary education. In the early decades of the 20th century, junior colleges were organized
in many states to provide Grades 13 and 14 under the auspices and authority of local school
districts (Diener, 1986). Consequently, the governance of community colleges was influenced by
K-12 institutions, and alignment during this period may have been more feasible.

After community college enrollments exploded in the 1960s, the leadership link to K-12
institutions began to fade as presidents, chancellors, deans, and directors were hired who had not
worked at the K-12 level. Kirst (1999) argued that historic attempts to provide mass education at
the K-12 and postsecondary levels resulted in significant disconnects between the levels and
entities as well as in faculty, curricula, and standards. Kirst noted with emotion, “Typically states
have a higher-education coordinating board and education chancellor, but they never talk to each
other. I mean never. They are like two separate orbits that never collide. There is just no force
bringing them together” (p. 2). This observation was further supported by Antonio and Bersola
(2004), who conducted a case study in six comprehensive high schools in California as part of
the Bridge Project. They noted a recurrent theme that surfaced in interviews with parents and
students about the absence of communication between policy makers working with higher
education and their policy-making counterparts in secondary education.

Logically, students, parents, educators, and legislators know that high schools should
prepare students to transition to college. Estimates vary about the number of students needing
remediation upon entrance into college. Kleiman (2001) noted that even on 4-year college
campuses nationwide, some 30% of college students arrive in need of remedial classes. If
assessments given in high school and at college admission are closely aligned, why do such a
high percentage of students require remedial courses? Kirst and Venezia (2004) found that
standards and assessments as viewed by K-12 versus postsecondary administrators were in
conflict in the six states they included in the Bridge Project, which included Illinois. College
admissions and placement officials reported that they were unaware of K-12 standards and assessments, and K-12 educators were usually unaware of specific postsecondary admission and placement policies. Postsecondary education officials, although aware of K-12 policies, were reluctant to use data from K-12 assessments because the exams were perceived as inconsistent and highly politicized. Both K-12 and postsecondary interviewees said they did not participate in drafting the standards or assessments at either level.

Because of the lack of communication between high schools and postsecondary education institutions, students are subject to a bastion of uncoordinated and misaligned exams originating from different sources. Kirst and Venezia (2004) discovered that many students find themselves taking at least three sets of high-stakes assessments during the last part of high school. The first set of exams is required for high school graduation, the second set for college entrance, and the third set for placement after being accepted into college. As just one example, in 1995 in the southeastern United States, universities had created 125 combinations of 75 different placement exams—with no regard for high school standards (Cohen & Brawer, 2003).

For some time, there has been no accepted standard for admission to college in the United States (Roueche & Roueche, 1993), which is understandable given the complexity of college missions and types of institutions. Even for colleges within the same strata, such as community colleges, there have been large differences in the set of skills that are expected of students, which creates difficulty for high schools desiring to prepare students properly for the transition. An early leader of the American Association of Community Colleges, Edmund Gleazer (1970) believed that community colleges should communicate clear standards to facilitate a student’s pursuit of a degree, but he also believed that colleges should be prepared to address the
educational needs of entering students whatever those might be. He recommended that community colleges

meet the student where he [sic] is. I am increasingly impatient with people who ask whether a student is “college material.” We are not building a college with a student. The question we ought to ask is whether the college is of sufficient student material. It is the student we are building, and it is the function of the college to facilitate that process. (p. 50)

In this passage, Gleazer alluded to a term that has become ubiquitous today: college ready. Currently, the notion of being college ready is used frequently even though neither colleges nor advisors agree on what the concept means, nor do they agree on the criteria necessary to be college ready (Conley, 2005).

Conley (2005) attempted to establish agreed-on standards for students to be college ready. His research covered a span of 3 years and involved 20 top U.S. universities that are members of the Association of American Universities. The result was the Knowledge and Skills for University Success standards, which were developed to answer one question: “What must students know and be able to do in order to succeed in entry-level university courses?” (p. 173). In 2003, the standards were distributed to every high school in the nation, state education departments, major universities, and educational policy organizations. Conley also defined college readiness operationally, writing,

The level of preparation a student needs in order to enroll and succeed without remediation—in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate program. “Succeed” is defined as completing entry-level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of course in the subject area. (p. 5)

Terenzini et al. (1994) sought answers to five questions concerning students’ transition from high school to college:
1. Through what mechanisms do students become involved in their institutions, both academically and socially?
2. What are the processes in the transition from high school or work to college?
3. Who assists or makes that process more difficult?
4. What are the negative and positive experiences of that transition?
5. Do different types of students experience that process differently? (p. 58)

Higher education institutions were selected to maximize diversity in student population and institutional type. Four institutions were selected to represent a community college, a liberal arts college, an urban commuter state university, and a large residential research university. These institutions were located in the Southwest, the Middle Atlantic states, the Midwest, and the Eastern part of the country. Contact people at the institutions chose students based on characteristics that represented the typical student who attended the institution; therefore, some groups were homogeneous and others were purposefully heterogeneous. The transition process varied for students and was confirmed by Terenzini et al. (1994) based on (a) educational, family, and social background; (b) personality; (c) orientation and aspirations, both educational and occupational; (d) the nature and mission of the institution; (e) the purpose and nature of encounters with various peers, faculty, and staff; and (f) the way all these variables interacted (p. 61).

For students at the research and liberal arts institutions that primarily enrolled White students, the transition to college was not monumental; it was an expected part of the educational process. Their major concern was adapting socially rather than academically. In contrast, first-generation college students were breaking family tradition, creating a major disjunction in their lives. Transition to college for them was a disruption to academic, social, and cultural aspects of their lives.

Terenzini et al. (1994) offered other important findings. They reported that high school friends could be viewed as assets or liabilities. If peers attended the same college, they often
provided a bridge from the high school environment to the college. If friends did not attend college, they could be a distraction and negative influence. Family could also be assets or liabilities, but either way, they played a vital role in the transition. Students at the liberal arts and transfer institutions seemed to take their parental support for granted more so than did the students who attended the community college and commuter institution. Black, Hispanic, and Native American families struggled with the changing relationship and were described as reluctant to let go. Validating students with self-doubts was thought to be of major importance in helping them overcome high school experiences that signaled they were not competent learners and were expected to fail. Terenzini et al. (1994) describe the importance of validation as follows:

Validation is empowering, confirming, and supportive. It is a series of in- and out-of-class experiences with family, peers, faculty members, and staff through which students come to feel accepted in their new community, receive confirming signals that they feel accepted in their new community, receive confirming signals that they can be successful in college and are worthy of a place there, have their previous work and life experiences recognized as legitimate forms of knowledge and learning, have their contributions in class recognized as valuable, and so on. (p. 11)

For students attending liberal arts and research institutions, validation was more about social acceptance than academic success. Their academic validation had occurred in K-12 and was further supported by their acceptance into the college of their choice.

Rendon (1994) used the review of research by Pascarella and Terenzini (1991), which identified certain relationships with peers and faculty members as influential in a student’s learning experience, to shape one of the general questions in her study: “How do students’ out-of-class experiences, particularly their interpersonal interactions, reinforce, augment, or attenuate curricular and classroom learning and achievement of broader general education goals?” (p. 35). The questions Rendon asked students were focused on how they made their decision to attend
college. She was interested in how the students were influenced by significant people and events in their decision-making process, and to whom they looked for validation that they were capable of attending college. Rendon suggested that students are subject to invalidation during class because of an “old model of student learning and growth” (p. 45). The students looked outside the classroom for encouragement. As a result, her recommendation was to move toward a classroom environment that emphasized validating students. In many ways, Rendon’s validation framework is similar to signaling. Students make decisions about college, and they are successful based on the signals they receive from significant sources in their lives. But signals emanate from a number of sources, not just family and friends. Rendon’s research opens the door for further exploration of signals from many other sources.

Institutional Policy Studies

The Bridge Project. The Bridge Project was a 6-year national study led by Michael Kirst beginning in 1996 to examine how high schools prepare students for college, including identifying the measures colleges were using when admitting students. The focus was on policies regarding admissions, first-year college placement or advising in 2- and 4-year institutions, and state-level policies affecting K-12 and postsecondary education (Kirst & Venezia, 2004). The study involved six states—California, Texas, Illinois, Oregon, Georgia, and Maryland—with hundreds of interviews and surveys conducted with parents, students, and counselors at the high school level. Kirst and Venezia studied policies that influenced the misperceptions of students and other factors that led to these conclusions; they collected data at the high school level wherein the researchers probed and questioned how students were affected by policies as they were planning to attend college. In reviewing the misperceptions of students, Kirst and Venezia
concluded that policies played a role but that other factors, such as money for college and student attitudes about grades, were influential as well.

Ten misconceptions that students had about preparing for and attending college were identified by Venezia, Kirst, and Antonio (2003):

1. I can’t afford college.
2. I have to be a stellar athlete or student to get financial aid.
3. Meeting high school graduation requirements will prepare me for college.
4. Getting into college is the hardest part.
5. Community colleges don’t have academic standards.
6. It’s better to take easier classes in high school and get better grades.
7. My senior year in high school doesn’t matter.
8. I don’t have to worry about my grades, or the kind of classes I take, until my sophomore year.
9. I can’t start thinking about financial aid until I know where I’m going to college.
10. I can take whatever classes I want when I get to college. (p. 31)

These misconceptions identified by Venezia et al. establish the importance of determining the role signals played in bringing students to these conclusions.

Recommendations of the study reinforced the view that clear signals are paramount to students’ smooth transition to college. The first recommendation noted the importance of providing high-quality information to students, parents, and educators regarding college-level standards. The second recommendation addressed signals sent by media, institutional policies, and research that focused solely on highly selective colleges and universities, leaving the impression that all higher education institutions had the same stringent requirements. The last recommendation suggested that as a nation, we have been successful in communicating access to higher education, but not so successful in the retention of students once they enroll in college.

Bridge Project—Illinois. The vastness of the Bridge Project supplies a wealth of information gathered from high schools throughout the country. Because a part of this study was situated in Illinois, a review of findings pertaining to Illinois is useful. Merchant (2004) reported
on the coordination of higher and secondary school education policy, and she noted that although Illinois is credited with several attempts to strengthen the transition from high school to college, efforts had fallen short at the time data were collected in 2003. In 1998, Education for the 21st Century was launched by the Illinois Board of Higher Education to address barriers to higher education access and quality. Hodel (1998) began this effort by setting seven goals:

1. Extend access to higher education;
2. Ensure that college is affordable;
3. Enhance access and success for members of underrepresented groups;
4. Improve the quality of education;
5. Enhance responsiveness to students, employers, communities, and the state;
6. Strengthen school–college partnerships; and
7. Improve productivity. (p. 1)

Although gains were reported with this initiative and a host of others, Merchant concluded that much work was needed.

The study of Illinois reported by Merchant (2004) was situated in central Illinois and focused on two major public postsecondary institutions, Illinois State University (ISU) in Bloomington, and the University of Illinois at Urbana-Champaign (UIUC), including each institution’s admission and placement policies. Seven case study high schools were surveyed to see how students, parents, and educators perceived the policies of the two universities. The study aimed for a full spectrum of information by surveying and interviewing not only the students, but also their parents and the educators at the respective schools. The student questionnaire had 30 items and was closely aligned with the parent survey, which had 19 items related to SES
background, perceptions of their children’s aspirations for college and career, and their knowledge of college admissions-related policies.

Placement and remediation at ISU and UIUC were treated slightly differently. ISU was reluctant to admit that remedial courses existed despite the fact that entering freshmen were given ACT’s COMPASS test (ACT, 2009) to determine math placement. A policy change in 2003 required all graduates to complete a university-level math course. Merchant (2004) speculated that this policy may create the need for more remedial math courses. UIUC gave language, chemistry, math, and composition entrance tests, and students who placed below college-level algebra were referred to a community college to take remedial math. Using a decentralized approach wherein each college had its own placement tests and procedures, central admissions departments had no information concerning placement processes or required standards for prospective students.

Five rural and two urban schools were chosen because they were located in central Illinois, in close proximity to ISU and UIUC. Surveys were administered to 9th and 11th graders and their parents, with the student survey administered to English classes at the high schools. More than 600 student surveys were collected that could be linked to surveys from the respective parents. The return rate was approximately 60%, with students primarily being from the middle SES (53%) and White (92%), and being evenly divided between honors and nonhonors students. After the student surveys were conducted, focus groups were held in English classes, with approximately 23 honors and 25 nonhonors focus groups. Individual interviews were also held with principals, teachers, and counselors.

To gather information on students’ plans after high school, surveys were administered to students and parents. In addition, students participated in focus groups, and counselors and
administrators were interviewed. These findings were influenced largely by family SES. Ninety percent of students had plans to attend college, but the lower the family SES, the more students indicated that they would attend college on a part-time basis.

Merchant (2004) found that teachers believed parental influence and family income were major factors in a student’s decision to attend college, and this belief was supported by findings from the student survey. There seemed to be a pervasive attitude among parents at the lower income level that college was cost prohibitive. Even though students were educated about financial aid at school, parents with a lower SES did understand the possibilities. Some teachers reported that few discussions of college took place in their nonhonors courses, and for those students, the present time was more important than preparing for their future. Whether role models among the family members who were college educated were available to students was not reported, nor was it evident whether students were discouraged because of college costs or whether their goal was to survive. These results suggested that students’ postsecondary plans were heavily influenced by SES, with students from families with a higher SES being more likely to choose UIUC over ISU. One-third of students in the lower SES bracket were leaning toward community colleges as compared with 18% of students with a high SES. Students admitted that parental concerns about cost played a major role in their college choice.

Overall college knowledge of tuition costs, required courses, admission requirements, selection criteria, and placement policies was lacking for all students. Students and parents in all SES categories tended to overestimate college costs at community colleges, ISU, and UIUC. However, they were more accurate about the cost of the community college than the university. Parents with a higher SES tended to be more accurate in estimating cost at the universities. A relatively low percentage of honors and nonhonors students knew the requirements for math at
ISU and UIUC, and it was the parents who informed their children about the math requirements. Students generally relied on parents and friends for information regarding college admission requirements, with 72.8% of students never talking with a college recruiter. Only a handful of students in any of the seven high schools had any knowledge of placement policies or procedures, and fewer than half had visited a college or university. College nights were poorly attended by honors and nonhonors students, with college visits being more likely for higher income families than lower income ones.

**Beyond “college for all.”** Rosenbaum (2001) made the following statement in reference to high school students, but it may be applicable to college students as well: “Schools do not give students clear signals of employers’ needs or of the payoffs for achievement. Nor do schools provide employers with clear signals about students’ capacity to be productive adults in society” (p. 241). Competency requirements and skills to enter the workforce after graduating from high school seem to be converging with the requirements and skills to enter college (Peltzman, Vranek, & Bodary, 2007). Rosenbaum noted that many students who claimed to be college bound on a survey ended up dropping out of college and thus entering the workforce with a high school diploma and minimal college credits. With the advent of the Information Age, the world of work has changed; thus, the educational needs of the workforce have changed as well. Not long ago, a high school diploma was a key to opening the door to a job that could lead a young person into adult life and supporting a family. But jobs have become more skilled and require a higher level of education than before.

Rosenbaum (2001) focused on students who did not attend college after graduating from high school, referring to them as the forgotten half. He explored the ways in which students, employers, and teachers perceived and interacted with one another. Even though Rosenbaum was
focusing on students who did not attend college, many of their reasons for disillusionment with higher education seemed to be related to the reasons students had for being ill prepared for community college. The “college for all” philosophy that targets a student audience may be sending the signal that high school is irrelevant by suggesting that regardless of a student’s high school academic record, community colleges are still an option. Rosenbaum used human capital theory to explain why high school students may not make a greater effort academically if they believe they can get the same outcome without effort.

The theoretical framework of signaling is one of four frameworks used by Rosenbaum (2001). This framework, which was also used by the Bridge Project, was espoused by Spence (1973), who, as noted earlier in this chapter, identified the signals that employers receive about hiring, such as that age and education are important to labor market outcomes. Rosenbaum explored how American students, employers, and teachers perceive each other, what information they receive about each other, and what actions they take to affect the youth work-entry process. He noted that signaling theory suggests individual employers make decisions about signals that are important in hiring. If employers respond only to signals that resonate with them, then there are no criteria for employee selection and employers individually determine which signals indicate desirability. The inconsistency in hiring criteria as described would make it difficult for youth (or anyone) to understand the requirements for job market entry. This scenario may also play out in education when individuals or higher education institutions determine what criteria to use in placing students into college-level courses. Students are then confused by the myriad requirements and tests they must take, failing to comprehend how their performance relates to college placement.
Rosenbaum (2001) indicated that the “college for all” philosophy and his conclusions about that philosophy might shed some light on the high level of remediation for newly graduated high school students entering community colleges. His data collection had three segments: (a) students’ perceptions, obtained by using detailed interviews of high school seniors in two high schools; (b) students’ views, obtained by surveying 2,091 seniors at 12 high schools across the Chicago metropolitan area from 1992 to 1994; and (c) students’ outcomes, obtained by using the 12-year follow-up of the High School and Beyond 1980 sophomores. He compared the “college for all” philosophy—which he contended was espoused by high schools—with Goffman’s (1952) accounting of developing someone’s confidence only to defraud them later. He argued that high schools encourage all students to attend college but fail to tell them what is required to be successful once there.

In 1993, Rosenbaum (2001) surveyed 50 students about the relevance of school to their future careers. The results were similar to those from an earlier study conducted by Stinchcombe (1965), which found that work-bound students did not feel school was relevant to their future careers. However, in the survey by Rosenbaum, both college-bound and work-bound students stated that school had no relevance to their future careers. During that 30-year period, community colleges were expanding their enrollments, and Rosenbaum attributed that movement to the change in students’ perception of college attendance. He concluded that there were “opportunity costs” to the “college for all” philosophy:

1. The “college for all” norm contributes to a lack of effort. Students are not likely to make great efforts in high school if they believe they can get the same result without working hard.

2. Because all students believe they are college bound, they fail to get any vocational training. If they do attend or are not successful in college, they do not have a skill for the workplace. (p. 80)
The policy implications Rosenbaum (2001) identified were drawn from the opportunity costs in an effort to change the way students think about college preparation:

1. High schools should attempt to relate high school work and preparation to community college success rates. One possibility would be to require a standardized achievement test.

2. Linkages between high schools and colleges may help students better understand college requirements.

3. Students should have a backup plan for career options if they are not well prepared for college. Vocational education should remain a viable part of the high school curriculum. (pp. 83–84)

Studies by Kirst and Venezia (2004) and Rosenbaum (2001) point to the lack of clear signaling by institutions regarding academic preparation and college readiness. Failing to prepare for college by not taking a rigorous course load and lacking college literacy contribute to difficulties when students transition to college. Their results suggest that poor preparation contributes to the eventual placement of newly graduated high school students into remedial course work.

**Remediation in Higher Education**

When the literature regarding the transition from high school to college was reviewed, the search inevitably led to remediation. Because this study examines student perspectives regarding placement in math directly out of high school, a review of studies on remediation provides a useful foundation. The search was guided by questions such as the following: (a) “What is remediation in higher education?” Grubb (1999) defined remediation as “a class or activity intended to meet the needs of students who initially do not have the skills, experience or orientation necessary to perform at a level that the institutions or instructors recognize as ‘regular’ for those students” (p. 174). However, a survey of higher education institutions,
especially community colleges, revealed that they do not recognize remediation, but rather offer developmental education. (b) “What is the difference between remedial education and developmental education?” Casazza (1999) identified underlying assumptions regarding developmental education that set it apart from remedial education. She argued that developmental education takes a holistic approach to the individual, rather than assuming the person has a deficit, as remediation seems to imply. However, Casazza’s viewpoint is not well known, and many institutions, especially community colleges, use the terms interchangeably. Students are even farther removed from the deliberation about labels and are far more concerned about how remedial or developmental course placement would affect their pursuit of a degree.

Remediation has been a component of higher education since the first institution was established in the United States, and in many institutions, it was and still is a well-kept secret. Thelin (2004) noted that early colleges bent admission requirements and provided preparatory and elementary instruction as a way of preparing future students. In the early years of education, it became necessary to provide remediation to attract students and keep the institution viable. As time passed, the justification for remediation may have changed, but the necessity of its existence never waned. When the GI Bill and the Truman Commission Report opened the doors of higher education to the masses, remediation became the portal through which many aspiring students had to pass (Merisotis & Phipps, 2000). It is an impossible task to provide access to higher education without providing the essential foundational skills of math, reading, and English, especially given the open-door admission policy of community colleges.

Remediation Studies
Merisotis and Phipps (2000) addressed issues surrounding remediation in higher education, focusing their discussion on the remediation background, social and economic costs, and recommendations: “Those halcyon days when all students who enrolled in college were adequately prepared, all courses offered at higher education institutions were ‘college level,’ and students smoothly made the transition from high school and college simply never existed” (p. 69).

As early as the 17th century, Harvard College provided tutors in Greek and Latin for those students who did not want to enter the ministry; even at the beginning of the 20th century, Harvard, Princeton, Yale, and Columbia placed more than half of their students in remedial courses (Thelin, 2004). The National Center for Educational Statistics (Lewis, Farris, & Greene, 1996) conducted a comprehensive survey of remediation in higher education and found the following:

1. In the fall of 1995, 29% of first-time, first-year students enrolled in at least one remedial reading, writing, or mathematics course. (This percentage increases drastically when community colleges are reported separately from other sectors of higher education.)

2. Regardless of the institution attended, first-year students were more likely to enroll in a remedial math course than in reading or English.

3. Two-thirds of institutions reported that students, on the average, were enrolled in remedial courses for less than 1 year. Twenty-eight percent were in remedial courses for 1 year.

4. In a comparison of data from fall of 1989 to fall of 1995, enrollment in remedial math was 21% and 24%, respectively. (p. 69)

Merisotis and Phipps (2000) recommended the following strategies for reducing the need for remediation in higher education:

1. Alignment of high schools with college curriculum and placement procedures;

2. Early intervention strategies to correct student academic deficiencies;
3. Early intervention financial aid programs; and
4. High school feedback systems.

Perin (2006) conducted a qualitative study of policies related to developmental education and found results that echoed those of Merisotis and Phipps (2000), who recommended the alignment of curriculum between high school and college as well as consistent competency expectations. A case study of remedial assessment and placement was conducted by Perin with four of the six states that account for almost half of the community college enrollments in the country. Perin pointed out that the term *college level* has never been supported with a definition that identifies set standards in math, reading, and English (Merisotis & Phipps, 2000; Oudenhoven, 2002; Phipps, 1998).

Perin (2006) identified five categories of institutional policies that have implications for how students are signaled about their readiness to take college-level courses: (a) assessment as mandatory or voluntary; (b) type of assessment measure; (c) setting of cut scores for the state or institution; (d) remedial placement, including mandatory or voluntary; and (e) timing of remediation concerning when the student is assessed and when remediation occurs (p. 10). These five institutional policies on remediation send signals to students about their preparedness for college-level course work and how committed the institution is to student success. Voluntary remedial placement can send a signal of support for student choice or a signal that the institution does not care enough to enforce strict guidelines that are intended to ensure student success.

Even though all the community colleges included in the study by Perin (2006) required some type of assessment, they were inconsistent regarding what the assessment should be. The institutions varied in terms of the subject matter tested, with some focusing on reading and math and others on required math, reading, and English. Some institutions waived the assessment
requirement if the student was entering a career program. In addition, many institutions gave instructors the option of overriding the student’s placement in remedial courses. For example, an English instructor could waive placement of a student in remedial English and allow that student to enroll in his or her college-level course. Even though 12 of the 15 sites studied by Perin mandated placement, they arrived at ingenious ways to circumvent the policy. Perin noted, “Tension between access and standards goals seemed to be played out most noticeably in remedial placement policy” (p. 356). The major findings regarding remedial placement were that (a) the institutions required placement even when the state did not mandate it, and (b) even though the institutions required placement, they had elaborate and sometimes confusing ways of sidestepping the requirement. Four colleges did not require assessment upon entry and allowed students to accumulate eight credits before testing. These institutions had confusing policies regarding when students should take a placement test to determine remediation. If students were perceptive enough to learn the system, they could sometimes avoid remediation until the end of their course work, and as a result, remediation became a graduation requirement, not an entry condition. By allowing students to complete some course work before testing, the four institutions provided access by encouraging students to enroll and make the process stress free. In many cases, however, students with low reading skills were overwhelmed with a text that was beyond their ability.

The age-old problem of defining college level continues to plague higher education, as evidenced by Perin’s (2006) five selected categories and the lack of consistency in any one area of placement and remediation. College level or college ready is subject to interpretation by the higher education institution, the high school, and the lens through which students process the signals they receive. Based on Perin’s findings, a high school student who is attempting to attend
college could conceivably take placement exams in three institutions and get three different recommendations for course selection. For example, a student could be eligible for college algebra at one community college and be required to complete intermediate algebra at another community college. Not only would the student be confused, but the signal to the sending high school would also be one of inconsistency.

Policy confusion leads to student confusion. The mixed signals that are sent by varying community college placement policies make it difficult for students to prepare to transition to college. Without clear guidelines, students do not know what is expected for success in college. Further, the interpretation of the policy by community college advisors and faculty can signal to the student that the policy is easy to bypass. Different cut scores in community colleges lead to inconsistent placement. Math has been identified as the remedial course into which students most often place. The issue is that confusing policies create signals that contribute to remedial math placement.

**Remediation and High School Math Preparation**

College algebra is often categorized as a “gatekeeper” course (Atanda, 1999, p. 10; Stinson, 2004, p. 8). *Gatekeeping* refers to the hierarchical nature of disciplines, such as math and foreign languages, in which the knowledge base builds with each course. The advantage of beginning to build a foundation in math at an early juncture in the educational process (such as eighth grade) is that it enables a student to attain a higher level of math competence in high school and it prepares the student for college-level math. As Caballero (1989) expressed in forthright terms, “I advise my students to listen carefully the moment they decide to take no more mathematics courses. They might be able to hear the sound of closing doors” (p. 2).
In 2005, prealgebra courses in community colleges across the country experienced a 57% increase in enrollment (Lutzer, Rodi, Kirkman, & Maxwell, 2007). Prealgebra courses are considered remedial, and they do not apply credit toward a degree. According to Atanda (1999), taking algebra and a foreign language in eighth grade can position the student in a sort of pipeline of courses that will eventually lead to decisions that are influential in attending college. Those students who enroll in algebra or a foreign language in the eighth grade are more likely to attain a higher level of math, such as algebra III, trigonometry, or calculus, in high school than are those students who do not take algebra or a foreign language in the eighth grade.

The importance of an eighth-grade student understanding the signal of high school and college preparation is paramount because eighth grade is the grade level at which students need to begin to prepare for college and a college major. Markow, Liebman, and Dunbar (2007) found in a survey that only 11% of middle school students reported having a large amount of information about choosing high school classes to prepare for college, and more than 28% said they did not have any information on the subject. In this study, signals were being sent by the middle schools, high schools, and guidance counselors that preparation and planning early for college was necessary, yet students were reporting they had not been given the information.

Bailey, Jeong, and Cho (2008) studied the developmental sequence recommended after college placement testing rather than focusing on a single course. Students who tested into math remediation, for example, might require two or even three remedial courses before enrolling in a college-level math course. The researchers examined the referrals to developmental education and whether the student actually enrolled in the recommended course. Students were tracked as they progressed through the sequence or failed to do so. The analysis was conducted using Lumina-funded Achieving the Dream data that included more than 250,000 students from 57
colleges in seven states. Because the Achieving the Dream sample was not representative of all community college students, results were checked against the National Education Longitudinal Study of 1988 (NELS:88). Students in the NELS:88 study were surveyed in the eighth grade in 1988 and in four follow-up surveys in 1990, 1992, 1994, and 2000. A questionnaire was administered in which students self-reported on a range of topics, including school, work, and home experiences; educational resources and support; the role of their parents and peers in education; neighborhood characteristics; educational and occupational aspirations; and other student perceptions (Adelman, Daniel, Berkovits, & Owlings, 2003).

The Achieving the Dream database used by Bailey et al. (2008) contained information on 256,672 first-time credential-seeking students who began in the fall of 2003 in 57 colleges that provided detailed information on developmental education. Students enrolled in remediation were followed through the summers of 2006 and 2007, or three academic years, and the study focused on math and reading in developmental education. The database contained information on gender, race or ethnicity, age at entry, full- or part-time enrollment, major, and all remedial courses taken and grades earned in those courses. The database contained information indicating whether students were referred to developmental education and whether they were enrolled in the level to which they were referred. Characteristics of Achieving the Dream colleges included full-time-equivalent enrollment, percentage of students receiving federal financial aid, instructional expenditures per full-time-equivalent enrollment, full-time retention rate, and a breakdown of location by urban, suburban, or rural. Rural colleges were grossly underrepresented in the Achieving the Dream colleges even though they constituted almost 30% of colleges in the states participating in the study.
Student placement in developmental education showed that 59% of students were referred to developmental math. Of the three levels of placement, 24% were assigned to one level below entry-level college, whereas 16% were two levels below and 19% were three or more levels below. Placement in reading was far lower, with 33% referred overall. Twenty-three percent were assigned to one level below entry-level college, 7% were two levels below, and 3% were three or more levels below. Students assigned to math one level below college completed at a lesser rate than students assigned to reading one level below college. The more deficits the students had, the less likely they were to complete their remediation sequence. The completion rate declined for students assigned two levels below in math and reading, to 29 and 36%, respectively. For those referred to three or more levels below college-level math and reading, the percentages completing were 16 and 22%. The average completion rate across levels for math was only 31%, and for reading, it was 44%. Almost 50% of all developmental students referred to any remediation level in math or reading did not finish the first course.

Students who were referred to a course one level below college level in math or reading had a high probability of completing. More than 50% of students who did not complete math or reading remediation did not go on to accrue college-level credit in any subject within 3 years. For those students who did complete their sequences, 50% or more went on to pass a gatekeeper course. This held true regardless of how many levels of remediation were required. However, of all the students referred to math remediation, only 15% went on to pass a college-level math course within 3 years, and only 20% of students referred to reading remediation went on to pass a college-level English course within 3 years.

When comparing the Achieving the Dream data with the NELS:88 data, the results that emerged were similar to those from a study conducted by Bailey et al. (2008). Approximately
33% of students in the NELS data set who were referred to precollegiate math failed to pass that course; 40% failed to pass basic algebra; and 35% failed intermediate algebra. Other findings followed: (a) Only a minority of students who needed developmental education completed their full sequence of developmental courses; (b) many never passed their first developmental course in their sequence; and (c) a majority of students who did not complete their full sequence of courses did so because they did not enroll in their initial course or a subsequent course, not because they failed or dropped out of any of the courses they attempted (Bailey et al., 2008).

Partly because placement in math remediation is the largest contributor to remediation, studies include a number of different perspectives. Kays (2004) conducted a study in Illinois that focused on remedial math textbooks and their possible contribution to the success rate of students in remedial math. Commonly used textbooks of combined or intermediate algebra were rated by mathematics education professionals using standards of the American Mathematical Association of Two-Year Colleges (AMATYC) for content, intellectual development, and pedagogy based on the pedagogical frames of Kirshner (2000). Kays found that 46 of the 47 textbooks used in Illinois during the fall of 2003 were classified in the habituation category. Habituation textbooks focused on unremarkable, disconnected exercises taught by applying deadening and disengaging processes. The AMATYC standards recommended the integration of math with context, which would provide the remedial student with hands-on application directly related to the degree or certificate he or she would like to obtain. The Illinois remedial math textbooks did not meet the AMATYC standards and thus did not address the needs of many community college students. The resulting recommendation was for community colleges to adopt remedial math texts that used an enculturation or constructivist approach to increase students’ opportunity to master math basics.
Conclusion

The concept of signaling provides the opportunity to understand the students’ viewpoint on the influences that shape their preparation for and transition to college. Educators send signals by providing information and guidance throughout a student’s academic career, but only the student can identify which signals made an impression. This study uses a qualitative design that seeks the student’s view of what signals have been received and processed in a manner that relates to their preparation for college-level math. Consistent with the qualitative research paradigm, I looked to the students to identify the signals that made a difference to them.

Terenzini et al. (1994) related the college transition process to signaling and communication theory by identifying factors such as cultural background, personality, peer influence, and institutional engagement as very influential. Communication theory, as related by Berlo (as cited in Ruben, 1992) suggests that skills, attitudes, knowledge, culture, and social systems are the filters through which people interpret messages (i.e., signals). Further supporting this idea, students interviewed by Terenzini et al. varied based on the type of institution they were attending and their general profile. Students at the liberal arts and transfer institutions viewed college attendance and parental support as expectations, whereas students at the community college and commuter institutions did not experience this same level of confidence and familial support.

Kirst and Venezia (2004) were instrumental in identifying issues to be addressed that would improve the curriculum and ultimately students’ transition from high school to college. Students in the 9th and 11th grades were asked to share what they knew about transitioning to two nearby universities. In this study, as compared to that by Kirst and Venezia, students were asked what they knew about transitioning to community colleges because these schools are the
gateway for first-generation, low-SES, and minority students. The community college student perspective provided insight into what signals were effective and what signals were not received or were viewed negatively.

Rosenbaum (2001) hypothesized that the “college for all” philosophy has convinced students that their high school coursework is irrelevant because, regardless of their academic performance in high school, they can always attend a community college. He argued that the open-door message of community colleges signals that the preparation for college that occurs in high school does not weigh heavily in the transition to college. Because students believe they are college bound and they do not understand that their preparation for college is inadequate, they fail to obtain vocational training, and they leave high school without adequate marketable skills to enter college or the workforce. Because of inadequate preparation for college during high school, there may not be a great difference in the students who do not enter college and those that are required to take remedial math courses at a community college.

Merisotis and Phipps (2000) examined the state of remediation in higher education. They found that large numbers of students require remediation upon entrance into higher education, but there is no universal definition of how the academic community defines remediation. The lack of a common definition for remediation also makes it nearly impossible to collect valid data on students enrolled in remedial courses, which prohibits having a full understanding of the seriousness of the situation and how to address it. This research attempted to delve deeper into this phenomenon by asking students to talk about their experiences with taking community college remedial math courses. Inconsistencies in college remediation policies, as noted by Merisotis and Phipps (2000), Perin (2006), and others, would appear to result in confusing signals that frustrate and complicate a student’s pursuit of a college education.
Atanda (1999) identified the significance of math in an academic career by calling it a “gatekeeper” course (p. 7). He discussed the value of taking algebra and a foreign language in the eighth grade, yet he noted that many students are not ready or do not understand the importance of higher level math in the eighth grade. Those students who delay math are likely to place into remedial math at the college level because their math recall becomes diminished with the passing of time. Furthermore, they do not make the connection between higher level math and college readiness until they are placed in a remedial math course in college.

Bailey et al. (2008) raised the question of the efficacy of remediation overall. Placement in remedial math was highest, with 59% demonstrating deficiencies. Students who are placed in intermediate algebra in community colleges do not obtain certificates and degrees at a high rate. Many students never pass their first remedial course, and many more do not even enroll. However, if students place into intermediate algebra, their chances are better for success and subsequent enrollment in college-level courses than in other disciplines. This raises the question of what students who are placed in intermediate algebra can tell us about their interpretation of signals designed to prepare them for college.

The literature review indicates a number of ways in which signals are communicated to students. The intention to improve the lives of students by providing access to education is foremost in the minds of educators, legislators, and taxpayers. Research on current practices is imperative to improve the quality of signals that students receive, and these ultimately contribute to the students’ eventual success and graduation. However, the quality of the signal should include an analysis of the target audience and consideration of the tools those students have to process the signal. True educational reform should take into consideration not only signals that
are being relayed formally and informally to students, but also the differences in the target audiences and how they decode those signals.
Chapter 3

Methods

This chapter includes the research design, which explains the methods and procedures used to analyze data for this case study of newly graduated high school students who tested into remedial math in a rural community college. The sections presented in this chapter are as follows: (a) research design, (b) site selection, (c) participants, (d) data collection, (e) data quality, (f) data analysis procedures, and (g) the role of the researcher. A qualitative approach was selected to investigate signals and their role in the decisions students make regarding college preparation and transition.

Community colleges are often the institutions of choice for students finishing high school who are uncertain of their college pursuits and who lack a college preparatory background (Kirst & Venezia, 2004; Rosenbaum, 2001). This study was situated in a rural community college in a state in the Midwest and used a qualitative case study design. Students were interviewed to gain a deeper understanding of their perceptions about preparing for college and for the part signals played in that process. At the community college, the following people were interviewed:

1. The administrator responsible for scheduling Intermediate Algebra, to provide a managerial perspective on remedial math; and

2. The faculty who teach the Intermediate Algebra courses of those students interviewed for the study.

At the high schools of students selected for the study, the following people were interviewed:

1. The math teachers, to learn about their role in preparing students for college based on the curriculum, teaching, and mentoring;

2. The guidance counselors, to determine what signals were given emphasis in their office; and
3. The principals, to obtain their viewpoints on the signals sent and the signals they believed to be the most effective in preparing students for college.

**Research Design**

It was not for me to determine who sent the signals or what they were, but for the students to identify what constituted a signal, which signals reached them, and how the signals they received influenced their preparation for college work. The goal of this study was aligned with a qualitative approach because the study was an attempt to identify themes in students’ perceptions that would explain why newly graduated high school students tested into remedial math. Stake (1995) compared quantitative with qualitative research and concluded that the former presses for explanation and control, whereas the latter presses to understand the complex interrelationships among all that exists. Conducting interviews with students allowed them to express their perceptions of the signals they received from myriad in-school and out-of-school sources and also to indicate any signals they did not heed.

Creswell (2005) defined *qualitative research* as an attempt to explore and understand a central phenomenon, in which the researcher asks broad, general questions of the participants and analyzes the responses, looking for themes. This approach allows the researcher to incorporate his or her experiences as the data are analyzed. The style of qualitative research that best fit this project was the case study. Creswell defined a *case study* as “an in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection” (p. 439). Yin (2003) described the case study as “a preferred strategy when ‘how’ or ‘why’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context” (p. 4). The bounded system for this study was the students in community colleges enrolled in remedial Intermediate
Algebra who had recently graduated from high school. It is a phenomenon that must be understood before educators can take action to address the lack of mathematics preparedness of students who enter college.

To classify the case study would mean identifying the type of study that is being carried out by its special features. Merriam (1998) listed the types of cases studies as particularistic, descriptive, and heuristic. Stake (1981) defined a heuristic case study as follows:

"Previously unknown relationships and variables can be expected to emerge from case studies leading to a rethinking of the phenomenon being studied. Insights into how things get to be the way they are can be expected to result from case studies." (p. 47)

Merriam stated that a case study can (a) explain the reasons for a problem, the background of a situation, what happened, and why; (b) explain why an innovation worked or failed to work; (c) discuss and evaluate alternatives not chosen; and (d) evaluate, summarize, and conclude, thus increasing its potential applicability (p. 31). This study fits this definition and is aligned with elements of a heuristic case study because its purpose was to understand signals about college preparation and what they meant to recent high school graduates who tested into remedial math and were enrolled in Intermediate Algebra in a community college.

Questions posed by this study are being asked throughout the country: "Why do high school graduates test into remedial math when entering community colleges?" and "How do high school graduates prepare for community college education?" Applying these questions locally with one remote, rural community college district will shed light on how administrators from K-12 to community colleges can improve signals to students that would better prepare them for math in the community college. The overarching goal of this study was to have students identify experiences that were relevant to their transition to college and their preparation for college-level math and tell how those experiences were interpreted. Bueschel (2003) stated that "more needs
to be known about the signals sent to students about the expectations and requirements for entering community college” (p. 281). Interviewing is a viable way to learn how much importance students attach to signals, including whether they notice them at all.

Situating the study in a remote, rural community college addressed a gap in the literature. The Bridge Project chose institutions that were in close proximity to 4-year institutions, and although some were located in rural areas, they were within 50 miles of two of the largest universities in the state. The Illinois study was conducted in central Illinois near two major universities, and students were asked to answer questions about college preparation in relation to these two higher education institutions. These institutions did not represent the remote, rural community colleges that are several hundred miles from universities. The sender and receiver of signals in very rural areas are shaped by an environment that is vastly different from that in suburban and urban areas. Hardy and Katsinas (2007) classified 35% of community colleges as rural, which is a large enough number to merit inclusion in many types of research.

The Illinois study provided an in-depth look at factors influencing students’ decision-making process to attend college by focusing on 9th and 11th graders who had not yet experienced the results of their decisions, thus providing a template for this study. The focus on students enrolled in remedial math (Intermediate Algebra) at a community college, allowed a reflective perspective on the outcome of their decision making. It is worth noting when comparing the Bridge Study in Illinois with this study that central Illinois has rural areas, but most southern Illinois community college districts serve large demographic areas where a 4-year institution is several hours away. According to the Atlas on Illinois Poverty (2003), the poverty in Southern Illinois is much higher than that in central Illinois. This suggests the merit of researching college going in other parts of the state, including highly rural, remote, and
economically distressed areas where high school students may have even less knowledge of and experience with higher education than students who reside in the central region of the state, where Illinois State University and the University of Illinois are located.

**Site Selection**

Creswell (2005) described a purposeful sample as one in which sites and individuals are intentionally selected to learn and understand the central phenomenon. The criteria for site selection for this study were as follows:

1. A community college in a rural setting using the schema of Hardy and Katsinas (2006), which classified rural community colleges into three categories: rural small, with an enrollment of less than 2,500; rural medium, with an enrollment of 2,500 to 7,500; and rural large, with an enrollment of more than 7,500, based on an unduplicated headcount.

2. A community college having some diversity in student population in terms of race and ethnicity (at least 10%).

3. The average income of community college district residents being below $50,000 and the educational goal being for bachelor’s degree attainment.

4. Local feeder high schools having varying sizes and being varying distances from the community college.

5. A community college having an existing policy that requires students to be placed in recommended remedial courses as a result of their college placement exam.

6. A community college offering Intermediate Algebra courses that enroll a sizeable percentage of newly graduated high school students and requiring these students to take a higher level math course that counts toward a degree.

The study focused on a remote, rural community college that met all the above criteria, which was given the pseudonym Middleton Community College (MCC). MCC enrolls a broad range of students, representing 11 high schools and five counties with a population of approximately 62,000, as reported by the U.S. census bureau in 2006. The unduplicated headcount at MCC
grew from 5,162 in fiscal year 2000 to 8,770 in fiscal year 2009. MCC uses COMPASS as the placement test, and mandatory placement is the policy:

Students scoring below established minimum levels on the entrance exam or writing sample are required to enroll in college preparatory instruction. The ASSET/COMPASS will be used as the official placement test for the institution and as the second chance test for all students entering degree or certificate programs, with the exception of Practical Nursing. All students requesting and taking a retest must do so by the end of the first week of the semester. The retest should be requested through the Office of Admissions and Advisement or through the appropriate 16 extension center director. Students will be allowed to retest only once. (“Community College Catalog”)

Because the institution is largely commuter, participating students were not limited to one area high school but represented several high schools with varying student compositions and curricula, which allowed investigation of a broader range of signals experienced by the students because of the diversity represented throughout the feeder high schools. It was important to the study to include several of the high schools, represented by the students interviewed, because this took into account the various institutional cultures, the diversity in student populations, and the local culture that influenced and contributed to students’ education.

**Profile of the site.** The MCC district is located in a rural, isolated area and has a moderately diverse population, with 16.5% African American and 2.5% Hispanic. According to statistics computed by the state’s lead governing body for community colleges, the ethnicity percentages are midrange for a large rural community college. Because of the location of the college district, it is considered economically depressed and, as a result, has a high unemployment rate. The counties that constitute MCC reported that 6,383 out of 24,429 households, or 26%, had an income below $15,000 in 2000. The number of households falling into the $15,000 to $24,999 range was 3,898, or 16%. According to the Department of Employment Security, in August of 2011, the five counties that MCC serves had an average unemployment rate of 10.5%, with a low of 10.2% and a high of 11%.
According to Nora and Rendon (1990), “Evidence is available to document that student sociodemographic factors (gender, race/ethnicity, SES [socioeconomic status]), precollege academic preparation and attitudinal factors are related to mathematics and science course-taking behavior and achievement” (p. 2). The diversity of MCC provided an opportunity to interview students of various ethnicities, both genders, and a range of SESs to determine if there were differences in the signals they received, to which they paid attention, and how they processed the signals they received.

Table 1 shows high schools in the five-county community college district, along with pertinent institutional data. The No Child Left Behind Act and Illinois law require the state to measure whether the school is making Adequate Yearly Progress (AYP), which is based on the percentage of students who meet or exceed standards on state tests, both as a whole and by different subgroups. If a school does not make AYP in the same subject area for two consecutive years, it is identified for school improvement. Of special note is that only one high school achieved AYP as outlined by No Child Left Behind. In addition, only one high school achieved the state average on the Prairie State Achievement Exam in math, which means the others were performing below the average of other schools in the state. For example, as shown in Table 1, only 9.5% of students in high school (HS) 2 met or exceeded standards in math in 2010, whereas for other schools in the state, 52.7% of their students, on average, met or exceeded state standards. The low-income numbers represent the school percentage as compared with the state percentage. In the column reporting percentages for Grade 11 in 2010 for math, the numbers represent the school percentage scores as compared with the state percentage scores that met AYP. The last column reports whether the school met AYP for the year.
**What is state status?** According to the Illinois State Board of Education, Fully Recognized means the school made AYP and is currently in compliance. AEWS means Academic Early Warning Status. These schools did not make AYP for two consecutive years and were eligible for state sanctions. AWS means Academic Watch Status. These schools failed to make AYP for two additional years after being placed on Academic Early Warning (or four annual calculations of missing AYP) and were eligible for additional state sanctions.
Table 1

*Feeder High Schools (HS 1 to HS 11) in the Community College District by Number of Students, Percentage of Race or Ethnicity, Income of Students, and Status of Adequate Yearly Progress (AYP) on Reading and Math*

<table>
<thead>
<tr>
<th>School</th>
<th>Status</th>
<th>No. of students</th>
<th>Race, %</th>
<th>Ethnicity</th>
<th>Low income, %</th>
<th>Grade 11 math in 2010, %</th>
<th>Met AYP reading</th>
<th>Met AYP math</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS 1</td>
<td>Academic Watch Status—Year 1</td>
<td>532</td>
<td>93.4</td>
<td>White</td>
<td>35.7</td>
<td>45.4</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.6</td>
<td>Asian</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.2</td>
<td>Native Am.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>226</td>
<td>7.1</td>
<td>White</td>
<td>100</td>
<td>9.5</td>
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</tr>
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<td></td>
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<td>90.7</td>
<td>Black</td>
<td></td>
<td>52.7</td>
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</tr>
<tr>
<td></td>
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<td></td>
<td>0.4</td>
<td>Hispanic</td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>178</td>
<td>73.0</td>
<td>White</td>
<td>84.3</td>
<td>45.4</td>
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</tr>
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<td>15.0</td>
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<td>22.7</td>
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Table 1 (continued)

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<th>School</th>
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<th>Race, %</th>
<th>Ethnicity</th>
<th>Low income, %</th>
<th>Grade 11 math in 2010, %</th>
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<td>Multiracial</td>
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<td>Hispanic</td>
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<td>0.3</td>
<td>Multiracial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Adapted from the Illinois Interactive Report Card (IIRC), 2010 PDF Report Cards, Illinois 2010 (http://iirc.niu.edu/).
Participants

Regarding the selection of participants for this study, the process resembled peeling away the layers of an onion. The process of selecting participants included contacting administrators and faculty to understand their thoughts on what signals were sent and received or missed by students in Intermediate Algebra. The process of participant selection involved the following:

1. Gathering an administrative perspective on remedial education at the community college and an overall philosophy regarding math preparedness, or the lack thereof, by interviewing the administrator responsible for scheduling remedial classes at the community college. One administrator was responsible for the math and science division at MCC.

2. Identifying a high school administrative perspective on math preparedness for college by interviewing the high school principals at the high schools attended by the students interviewed for the study. Two high schools from which students had graduated were selected. In one case, two students had graduated from the same high school.

3. Determining an instructional perspective on remedial education and the overall philosophy regarding math preparedness, or the lack thereof, at the community college and high school levels by interviewing the Intermediate Algebra instructors at the community college and complementing that perspective with interviews of math instructors at the high school level. Four full-time faculty members were selected based on the number of classes they taught. The criteria reviewed were their tenure at the school and the breadth of math curriculum they taught. The administrator also taught Intermediate Algebra, and she had been at the institution for more than 20 years. Two of the faculty members had begun as adjunct, one of whom had been hired recently and the other having 20 or more years of experience. The fourth instructor had been with the institution for approximately 12 years. Two of the faculty members taught math courses for engineering as well as Intermediate Algebra.

4. Determining an advisory perspective on math preparedness from the high school by interviewing a high school counselor at one of the high schools attended by the students interviewed for the study.

5. Interviewing 10 students from two high schools who were enrolled in a minimum of two Intermediate Algebra courses and who had graduated from high school within the last year. The age range was 18 to 19 years of age. Recruitment was accomplished by visiting three Intermediate Algebra classes and asking for volunteers. Students filled out a form with information about their education, and those forms were reviewed to select participants. Age, gender, ethnicity, and the high school attended were the selection criteria.
6. Seeking permission to review the students’ high school transcripts and COMPASS placement scores, which also guided the selection process, by identifying students who had varied math preparation in high school.

The first student interviews were conducted in October 2009 to capture their perceptions early. A follow-up phone interview in January 2010 was used to capture the student perspective after completing the course. Students were interviewed from three Intermediate Algebra classes with different instructors. Interviews were conducted one-on-one with faculty and administrators at a convenient time for the participants and were interspersed throughout the window of time during which the student interviews were conducted. High school counselors, administrators, and teachers were interviewed in January 2010.

**Data Collection Process**

The researcher requested permission from the MCC president and gained subsequent permission from the institution’s institutional review board to conduct the study. The instructors of three Intermediate Algebra classes were contacted shortly after the beginning of the fall semester to set a convenient time for the researcher to visit the class and solicit participation for the study. After explaining the study, students who had graduated from high school within the last year and were willing to participate were asked to complete a demographic form. The demographic forms were reviewed by the researcher and used to help determine the students eligible for the study, based on age. Students who qualified were asked to sign a consent form releasing their records in the MCC Admissions Office to the researcher. The number of volunteers was approximately 15, but by the time selection was made, 3 of the students chose not to participate. Two students did not appear for interviews, which left 10 students who were interviewed. Once the demographic forms and student records were reviewed, the researcher
made the selection and contacted all the students to inform them of their participation status.

Selection of students was based on the following factors:

1. Levels of math taken in high school;
2. Grades in high school math;
3. Length of time from the last math course to the present; and
4. COMPASS math test scores, to indicate if the student tested at the high or low end of the remedial algebra placement.

A mixture of factors, such as a slight variance in age, allowed for the collection of broader, richer data in the interviews. After interviewing students in the community college math courses, the high schools those students attended were identified so that interviews could be conducted with math teachers and principals there to determine how these educators viewed the signals they send about college and math preparation.

To orient the researcher to the institution, a day was spent at the college meeting and talking with faculty members and visiting their classes to collect the student demographic form. This preliminary visit allowed the researcher to learn about the campus culture and environment, and it familiarized her with the institution. Observing faculty, staff, and students at the institution added another dimension to the study.

A personal interview conducted with the administrator who was responsible for remedial math education contributed to the understanding of signals and their role in the high math remediation rates. This person directs policy, requests fiscal support, and shapes the philosophy of the institution toward remedial education. This person also advocates for the remedial math programs, influencing where programs are located and how much space they are allowed. The scheduling of remedial math courses and the hiring of faculty also occur at this level. The interview questions mirrored those asked of students and were piloted with colleagues not
participating in the study. The Bridge Project Toolkit Website provided a template to structure the interview questions.

An interview was held with 10 students from three Intermediate Algebra courses in a comfortable setting on the community college campus. All attempts were made to make the students comfortable and to hold the interviews in a convenient location on the campus, to encourage student participation. The interviews for all participants were audio recorded, and the interviewer made note of facial expressions, voice tone, and body language. The researcher conducted the interviews and recorded student reactions. The notes enhanced the recorded version of the interview and assisted the researcher in recalling all aspects of the conversation. The interview process was daunting, and the researcher needed to focus on the subjects and their reactions to the questions to keep the interview flowing smoothly.

After interviewing the community college students and reviewing where they had attended high school, an interview was conducted with the high school math instructors who taught the highest level of math the students had taken, using questions similar to those in the interviews conducted with community college administrators. All interview questions can be found in Appendix A, regarding remediation and the signals that are intended to assist students in making a successful transition to a community college. Counselors and principals at these high schools were also interviewed because they play an important role in sending signals to students regarding all aspects of preparing for college.

Intermediate Algebra instructors at the community college were the next group interviewed. Four faculty members were interviewed: three who taught the Intermediate Algebra classes of the students interviewed, and one who was also the administrator responsible for scheduling. An instructor who had taught Intermediate Algebra for several years provided
valuable insights into the trends he observed while teaching the course. Once again, the interview questions were drafted to mirror those asked of the students and were piloted with colleagues not participating in the study.

The diagram below outlines the people who were interviewed. The process began with the MCC administrator, but all the other interviews emanated from the student sessions.

![Diagram](image.png)

*Figure 1. Relationship of various groups to the students interviewed for this study. MCC = Middleton Community College.*

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Figure 1 clearly shows that students were the primary voice of this study. Their interviews were the most central to this analysis of signals instrumental to their preparation for college math. The arms emanating from the nucleus represent interviews conducted to corroborate information gained from the student interviews and deepen the understanding of the data. The relationships among the supporting interviews represent teachers, guidance counselors, and administrators at the district feeder high schools and MCC.

To understand all the signals students were receiving about college preparation, college catalogs and schedules, high school brochures, and any other pertinent publications were gathered to determine the signals being sent to students who were transferring to college. In perusing the publications, particular attention was given to placement and testing information because it related to transfer and career technical programs, requirements for college-level math, and a discussion or explanation of remedial courses. Websites of the high schools and colleges were perused to screen for information that related to the college transition. The information gathered from these sources was also helpful when interviewing students because it allowed the researcher to incorporate foundational information into the questions for the student focus groups. By including instructors at the high school and community college level, conducting interviews with the students, conducting interviews with high school principals and counselors, and including an interview with the person responsible for remedial education at the community college, a full circle of information was gathered.

The names of the interviewees were coded, and the college district was given a fictitious name. The protocol followed was reviewed and approved by the institutional review board of UIUC. All precautions were taken to ensure that the results could not be tied to participants and that participants were comfortable with the interview process. Students who participated were
high school graduates and 18 or older; an information sheet was required of participants to ensure that they were of age and to gain access to their personal records.

Data Quality

Creswell (2005) described the validation of findings as the researcher testing his or her accuracy or credibility by using methods such as member checking and triangulation. Member checking was used in this study to determine the accuracy of interviews with all participants, namely, the college administrator, the students, the high school and college math instructors, the high counselors, and the high school principals. All transcripts of one-on-one interviews were submitted to the participant for validation.

Although triangulation has been criticized as being overused and inappropriately applied, it can still be a viable method of validation. Marshall and Rossman (1995) described triangulation as “designing a study in which multiple cases, multiple informants, or more than one data gathering method are used” (p. 144). Creswell (2005) defined triangulation as “the process of corroborating evidence from different individuals (e.g., a principal and a student), types of data (e.g., observational field notes and interviews), or methods of data collection (e.g., documents and interviews) in descriptions and themes in qualitative research” (p. 252). This research study used multiple informants but focused primarily on interviews with students who were participating in two different intermediate math courses as the main source of information. Interviews were conducted with administrators at the community college level to determine the institution’s philosophy on remedial education. Interviewing instructors from the high schools and the community college provided valuable insights from the classroom. The interviews with high school counselors and principals complemented the different perspectives on signals in both
their intent and their interpretation. Reviewing websites and printed materials from both the high school and community college levels provided another method of data gathering.

Interviews can be challenging to conduct (Creswell, 2005). Tape recording the discussion, using observations and notes, and using interviewer recall ensured an accurate account of the interviews and contributed to a thick, rich description of the signals. Immediate transcription of the notes assisted the researcher in remembering as much of the interview as possible. The schedule for student interviews was set up in late October, and interviews with high school and community college personnel were conducted in November. At the time of transcription, the researcher began to look for themes on signaling. After the follow-up phone call interviews with students in January, the notes were compared with the initial interviews and analyzed. Write-ups of the interviews were immediate so that the researcher could begin to look for emerging themes.

Yin (2003) described triangulation as collecting information from multiple sources. However, triangulation alone does not guarantee validity. Rather, the evidence should converge. Interviewing students, counselors, teachers, and administrators met this definition, but to qualify as triangulation, the information from these sources had to be compared and analyzed collectively.

Member checking is another way to verify data quality. Merriam (1998) defined member checking as “taking data and tentative interpretations back to the people from who they were derived and asking them if the results are plausible” (p. 204). Students, counselors, teachers, and administrators were asked throughout the study to verify the accuracy of the interview accounts. After the interviews were transcribed, a copy of the transcript was sent to the interviewees for verification of the content, and to give them an opportunity to remove any troublesome accounts.
or information. Transcription of the data was completed and sent for review in March 2010. Creswell (2005) recommended that members check many aspects of the study, such as whether the description is complete and realistic, and whether the themes are accurate.

Yin (2003) recommended the process of peer examination as another way to support data quality. He described peer examination as seeking comments from colleagues on findings as they emerge. A colleague was recruited to review the study throughout the writing process to ask questions and provide a different perspective on the data and research. Specifically, Chapters 4, 5, and 6 were reviewed in December 2011 to obtain feedback on clarity, flow, and other possible themes. Questions about the student profiles prompted clearer explanations of the students’ stories. In addition, recommendations were made to separate some text and place it in a section on final thoughts. The comments and ensuing discussion prompted me to view some of the student data in a different way, which strengthened the findings.

**Role of the Researcher as Data Collector**

Because of my background in rural community colleges, partiality is unavoidable. Not only have I worked in community colleges for 25 years, but I am also a graduate of one. In addition, I grew up in a rural area and have experienced the challenges of obtaining an education because of lack of availability. In an article on subjectivity, Peshkin (1991) recommended that researchers acknowledge their subjectivity and thoroughly examine it before beginning the qualitative process:

First, I decided that subjectivity can be seen as virtuous. For its existence underlies a researcher’s making a distinctive contribution, one that results from the unique configuration of the writer’s personal qualities joined to the data he or she has collected. Second, I decided that in subsequent studies I would actively seek out my subjectivity. I did not want to happen upon it accidentally as I was writing up the data. (p. 456)
The recognition and self-analysis of subjectivity is healthy and unavoidable. Everyone views the world through a different lens, and that is part of what makes research interesting. Subjectivity for me means that I have unique insights into the challenges that students face in obtaining an education when living in a rural area. Having worked with students for 25 years in a community college setting was an asset when interviewing the students and helping them feel comfortable and willing to share their experiences.

**Pilot Study**

A pilot study was conducted (McGlone, 2008) to test the method of student selection as well as the instruments designed specifically for this study, including a demographic survey and interview questions. Marshall and Rossman (1995) contended that the inclusion of a pilot study strengthens the proposal because it allows the questions to be tested and gives the researcher experience in interviewing. If the instruments are found to be lacking in design, changes can be made before the main research and data collection begin. The goal of my pilot study was to test the proposed research design and use the results to refine the actual study. For example, findings from the pilot study helped to determine the necessity of asking students about their SES. After conducting the student interviews, it became clear that SES was a factor in the students’ educational decision making. They discussed math teachers who had influenced them, both positively and negatively, and they identified teachers as their guiding mentors, not the guidance staff. Three students were interviewed for approximately 45 minutes, and these interviews helped to refine my interview skills.
Data Analysis

Data analysis was described by Creswell (2005) as an iterative process. Data are gathered and located in one area, and notes are transcribed. The researcher then familiarizes himself or herself with the material, codes the data, and looks for themes and description. In this study, the goal was to transcribe notes from the interviews as soon afterward as possible. Coding was accomplished in segments and was reviewed as new information was gathered. The codes were then used to identify themes.

Interviews were transcribed by the researcher shortly after the session ended. The notes and recordings were used to ensure that an accurate description of the conversation was recounted. Notes transcribed by the researcher enabled memory and recall of the scene as well as the conversations with the students. Materials collected from the high schools and community college were also reviewed. After all the information was recorded, the researcher began to read through the data to gain a sense of the overall meaning.

Coding of the information began, but no software was utilized. Creswell (2005) recommended organizing the material into chunks to begin to bring meaning to the data. After organizing the data into chunks, I looked for themes and attempted to make interpretations of the data. Interview data were analyzed using a grounded or inductive theory-generation approach so that a conceptual framework could be generated from the data (Glaser & Straus, 1967). Creswell defined grounded theory as “systematic, qualitative procedures that researchers use to generate a theory that explains, at a broad conceptual level, a process, action, or interaction about a substantive topic” (p. 592). This process was supported by my 25 years of experience working in community colleges. Much of my time has been spent with the placement of students in courses after high school graduation. I have familiarity with the COMPASS instrument that the college
district uses for placement. Synthesis of the literature reviewed assisted me in identifying new and applicable themes to answer the research question, “How do signals lead a student to place into developmental math as a high school graduate?”

Because this study was situated in one college district, generalizations beyond the sample cannot be made. However, the study can provide a depth of understanding about how students interpret the signals they receive about their preparation for community college. Individuals in higher education in general may benefit from learning how students are preparing for college and, consequently, strategize to improve the messages sent about the preparation necessary to be successful in college.
Chapter 4

Profiles of the Research Participants

The purpose of this chapter is to address the first research question, which is, “What experiences do students identify as relevant to their transition to college and preparation for college-level math?” The information included in each profile is both personal and academic, to establish the background of the students as they entered the Intermediate Algebra course. Each profile includes (a) my first impression of the students; (b) their performance in high school math; (c) their family backgrounds; (d) their aspirations to attend college; and (e) follow-up on their persistence in the Intermediate Algebra class. This chapter introduces the students interviewed for the study, and then gives the reader a sense of who the students are and what their perspectives are on math preparation for community college. Each profile also contains a brief observation I made when I followed up with the students in January 2010 after the completion of the fall semester when they were interviewed. A second transcript was obtained at the beginning of the fall semester 2010. The follow-up focused on grades received in the Intermediate Algebra class, the enrollment of the students in subsequent math classes, and their progress toward degree completion.

The students interviewed represent a very diverse sample of community college students. The 10 students were a mix of male (2), female (8), White, Latina, and African American. Seven of the students lived within the college district, and three had transferred in to play basketball. Their academic backgrounds varied from students who had taken Advanced Placement (AP) courses to students who had not taken Algebra I until their senior year. Table 2 presents the demographics of the students participating in the interviews.
Table 2

Demographics of the Students Interviewed

<table>
<thead>
<tr>
<th>Student</th>
<th>Ethnicity</th>
<th>Gender</th>
<th>Athlete</th>
<th>Residence</th>
<th>Year graduated</th>
<th>Initial college math placement</th>
<th>Years of HS math</th>
<th>Last HS math class w/ grade</th>
<th>Class rank</th>
</tr>
</thead>
<tbody>
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<td>Rena</td>
<td>White</td>
<td>Female</td>
<td>X</td>
<td>Out of state</td>
<td>2009</td>
<td>Int. Algebra</td>
<td>4</td>
<td>Algebra III w/ A</td>
<td>41/117 = 65%</td>
</tr>
<tr>
<td>Lewis</td>
<td>African American</td>
<td>Male</td>
<td>X</td>
<td>Out of state</td>
<td>2009</td>
<td>Intro to Algebra</td>
<td>4</td>
<td>Algebraic Concepts w/ low C</td>
<td>45/70 = 36%</td>
</tr>
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<td>Shawn</td>
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<td>Female</td>
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<td>In district</td>
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<td>Int. Algebra</td>
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<td>Algebra II w/ A</td>
<td>11/45 = 76%</td>
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<td></td>
<td>No math senior year</td>
<td></td>
</tr>
<tr>
<td>Alan</td>
<td>White</td>
<td>Male</td>
<td>X</td>
<td>Out of district</td>
<td>2009</td>
<td>Intro. to Algebra</td>
<td>4</td>
<td>Algebra II w/ low B</td>
<td>53/106 = 50%</td>
</tr>
<tr>
<td>Michelle</td>
<td>White</td>
<td>Female</td>
<td></td>
<td>In district</td>
<td>2008</td>
<td>Intro. to Algebra</td>
<td>4</td>
<td>Geometry w/ C</td>
<td>24/49 = 51%</td>
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<tr>
<td>Bea</td>
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<td>In district</td>
<td>2008</td>
<td>Intro. to Algebra</td>
<td>4</td>
<td>Algebra II w/ C</td>
<td>16/49 = 67%</td>
</tr>
<tr>
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<td>Female</td>
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<td>In district</td>
<td>2008</td>
<td>Intro. to Algebra</td>
<td>4</td>
<td>Geometry w/ F</td>
<td>28/38 = 26%</td>
</tr>
<tr>
<td>Nicole</td>
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<td>Female</td>
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<td>In district</td>
<td>2009</td>
<td>Int. Algebra</td>
<td>4</td>
<td>Calculus w/ B</td>
<td>8/21 = 62%</td>
</tr>
<tr>
<td>Dawn</td>
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<td>In district</td>
<td>2008</td>
<td>Int. Algebra</td>
<td>3</td>
<td>Algebra II w/ D</td>
<td>20/38 = 47%</td>
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<td></td>
<td>No math junior year (skipped Geometry)</td>
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</tr>
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<td>Patricia</td>
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<td>Female</td>
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<td>Trigonometry w/ A</td>
<td>10/45 = 78%</td>
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*Note. HS = high school.*
Alan

I interviewed Alan on October 27, 2009. We met in the lobby of the school and then went to a conference room at the community college. Alan was a confident, outgoing young Caucasian male who had to be encouraged by his instructor to volunteer for this project. Alan had graduated from a nearby high school, which was in another community college district. He had chosen to attend Middleton Community College (MCC) to play basketball and had actively pursued the coach to vie for an opportunity to try out for the team. Alan did not want to attend the community college in his own district because his friends had portrayed it to him as a “bad campus”:

I just didn’t like it. I have a lot of friends that go there and they didn’t like it. Like I say, there’s all of these people that get in fights and it’s just a bad campus, bad school to go to.

Education. Alan graduated 53rd out of 106 in his class, which placed him in the middle of his class, at the 50th percentile in class rank. He took Algebra I his freshman year and earned a low D, then in his sophomore year, he took Prealgebra and earned a C. His junior year, he took Geometry and earned an A. He took only one semester of Algebra II his senior year and received a low B average. This math placement was puzzling because he went from a failed Algebra I class to Prealgebra and then on to Geometry. He should have taken Algebra I and successfully completed it before taking Geometry. His COMPASS test scores placed him into Introduction to Algebra at the community college, which he took in the summer of 2009 and passed with a B. When I talked to Alan about his COMPASS math placement, he told me that he had taken the test twice in hopes that he would score better. He did not test out of Introduction to Algebra, and when I asked him about the class, he said, “I got like an A in it easily. I really didn’t even pay
any attention to the teacher.” When I interviewed Alan, he was taking Intermediate Algebra and felt that it was going well.

In reviewing Alan’s high school transcript, his grades were average, in the C range. He received an A in Sports Officiating and Physical Education. He seemed to do better in Career Technical classes, such as Construction and Electronics. Alan revealed that part of his difficulty in high school was maturity: “I was a bad student. I matured a lot throughout high school.” His grades in English seemed to reflect that perception. Alan was a C student in English his freshman and sophomore years, but in his junior and senior years, he averaged a high B.

**Family background.** Alan had a stable family background, with both parents being involved in his life, and he had an older brother who had joined the Navy. From our discussion, I gathered that Alan was native to the area, and his transcript showed that he had attended the same high school for 4 years. He checked his family income on the demographic sheet as being between $40,000 and $60,000, which is quite high for this rural area. He marked on his demographic form that his father had less than a high school education and his mother had graduated from high school. Thus, he is a first-generation student.

**Aspirations for college.** Alan’s parents did not attend college, but they encouraged him to go. They let him know of their pride in his college attendance. Their attention to his grades in high school sent him a strong signal that they expected him to work hard. However, they did not help him plan his high school schedule. This may be because they did not attend college and felt inadequate to advise him. They did discuss financing college, but money was not a huge concern because Alan planned on getting a basketball scholarship to help pay for his education.

Alan wanted to be a physical education teacher and a coach, but when I asked him about the amount of information he had received about college while in high school, he said, “Not
enough. I’m still learnin’ stuff as I’m here.” When I asked him if he had been given any
information about math preparation for college, he said, “All I knew was I had to have more than
three credits to graduate from high school.” Alan’s perception of the guidance counselor in his
high school was positive, and he felt that he had helped him select courses that prepared him to
attend MCC, yet that relationship seemed to be based on friendship more than quality of the
guidance:

I mostly just talked to them. We had one, he was a younger person, and he was just real
cool. I talked to him a lot. He helped me a lot. He’s the one that helped me select my
classes actually through high school, and he helped me do everything to transfer to here.

Given Alan’s need to take Intermediate Algebra, it is difficult to know whether Alan was given
information to transition to college that he did not heed, whether his high school record reflects
poor guidance, or whether he really was not prepared to take college-level math.

**Follow-up after 6 months and 1 year.** When I obtained Alan’s unofficial transcript on
August 25, 2010, to see how he had progressed, I was disappointed to find that his last semester
of enrollment was spring 2010. He had earned a B in the Intermediate Algebra course, and his
overall grade point average (GPA) at that time was 3.43. In spring 2010, however, Alan had
failed four classes, which led me to believe he had dropped out or failed to withdraw from these
classes. He completed three other sports-related classes, with an A in all three.

**Bea**

Bea was in the first class from which I recruited students. She was a ready volunteer, and
during the interview she talked openly about her experiences as a Latina in a class of mostly
White students. I immediately liked her. She answered questions in a relaxed, reflective manner.
Bea was uncertain of her major but was considering accounting. I was struck by her admission of
being afraid to go to college. She mentioned her fear of college several times during the interview.

**Education.** Bea graduated 16th in a class of 49, which is in the 32nd percentile of her class. She had 4 years of math in high school: Prealgebra her freshman year with a very high A, Algebra I her sophomore year with a solid B, Geometry her junior year with a high C, and Algebra II her senior with a C average. Bea tested into an Introductory Algebra class, and for some reason, the next semester she was forced to take an Introductory Geometry class even though she had Geometry in high school with a decent grade. When Bea and I met, she was taking Intermediate Algebra. She felt that her first math class in college was “too easy,” and she completed it with an A. In her words, “And I got thrown off to a Geometry class that I didn’t need because I had taken Geometry in high school. So, I mean Geometry was easy as well.” And indeed, Bea earned a B in the Geometry class at the community college. She questioned her placement and wondered why she was not placed in a more challenging math class in the beginning.

Bea’s high school math teacher was actually the one who encouraged her to go to college:

There was this one teacher, my math teacher, that I told him I wasn’t gonna go to college and was pretty upset. He was like, “I will help you enroll if you need help,” and I’m like, “Okay.” He kind of gave me a list of what to do, of things to do.

Bea’s math teacher apparently felt she had potential to succeed as a math student and to succeed in college.

**Family background.** Bea is a first-generation Latina student. When starting college, she had no resources to draw on, even though her parents were encouraging. Her parents signaled the importance of college but knew nothing about college, and I think her shy nature may have
prohibited Bea from being aggressive in obtaining information. She talked about the disadvantage of having parents who did not have an understanding of the college process:

Because my parents didn’t go to college so I’m first generation going, so it was really hard trying to figure all this out during the first semester. So, it was kinda out there and then you really catch things when I was in the middle of it, and I was like, “Okay, now I get it,” but it was a little late, but I get it now.

Bea was the oldest child in her family, so she was setting the example for her younger siblings. She reported a family income between $10,000 and $25,000.

**Aspirations for college.** When I asked Bea what grade in school she was when she started thinking about college, she told me that she did not begin serious planning until her junior year of high school: “I began to think I’m running out of time. I need to know what I’m gonna do.” Financing college was not really discussed much with her parents because the cost of the community college was not as much of a concern as the university.

Bea mentioned the pattern of choice that many of the young people in her Hispanic community had made and a math teacher who encouraged her to break that pattern:

Uhm well, see, it’s an Hispanic thing that had been going on at the school. A lot of girls my age were either dropping out or getting married or just stuff. And he really thought I had potential, and he thought that, uhm, he had faith in me.

The math teacher gave Bea a list of things to do to enroll in the community college and even offered to go with her to enroll.

It would seem that Bea had many champions that encouraged her to enroll in college. She frequently mentioned a friend and the mother of that friend as being instrumental in convincing her to enroll in college. The mother worked at the community college and mentored Bea through the process of registration and financial aid: “I was scared, and I didn’t really come until the last minute. It was like a couple days before registration when I finally came in.” Bea’s circle of friends were headed for the community college and encouraged her to do the same, but I got the
impression that had it not been for her friend and the mother who worked at the community college, Bea would not have enrolled.

**Follow-up after 6 months and 1 year.** I interviewed students in November 2009 and January 2010. The college allowed me to request an unofficial transcript on August 25, 2010, to see how the students had progressed. Bea successfully completed the fall semester in 2009 and the spring semester in 2010. Her cumulative GPA was 3.26, and she had achieved a 3.58 GPA for the spring semester of 2010. Her enrollment in the fall semester of 2010 indicated that she would need to take 3 years to finish at the community college before transferring to a university. It did not appear to me that she was pursuing a degree in accounting, based on the classes in which she had enrolled. I believe that the incorrect placement in math cost her a year in college attendance.

**Dawn**

I interviewed Dawn on October 27, 2009, in the conference room at MCC. She readily volunteered for the interview and was a friendly, open Caucasian female. Dawn graduated from a high school about 1 mile from the community college. According to the information on her transcripts, Dawn had grown up in the area. She indicated on her demographic form that she was majoring in early childhood education with a minor in psychology.

**Education.** Dawn graduated 20th out of 38 in her class, which placed her in the 52nd percentile in class rank. According to my review of Dawn’s high school transcript, she had taken Prealgebra her freshman year and received a low B; she had then taken Algebra I her sophomore year and received a C. In her senior year, she had taken Algebra II for one semester and received a D. Unfortunately, I did not ask her why she had not taken any math classes her junior year even
though her transcripts suggested she was behind if she wanted to transition to college. Dawn’s experience was very similar to Marie’s (see below) in that she placed into Intermediate Algebra even though she had a poor math background in high school. She failed Intermediate Algebra and went on to enroll in Introduction to Algebra in the spring of 2009, which she passed with a C.

Dawn did not receive signals from her high school guidance counselor that pushed her to take math her junior year and study harder because she would need those math skills in college. Dawn failed again at the community college level because she was placed in an Intermediate Algebra class for which she was ill prepared, according to her high school transcript. When I asked her about it, she replied, “He [the advisor] put me in the wrong one first, so that semester I quit going. I just didn’t go anymore. I’m failing anyway, so what’s the use in wasting my time.” Dawn was aware that this behavior cost her time in degree completion:

Now I don’t know if I can graduate or not. Because I have to have three maths and I don’t even know if I’ll have that or not. But then I actually went to a better counselor, and she set me straight.

Dawn’s transcripts indicated that she took dual-credit classes her senior year. Her English grades were in the B range throughout high school. It would seem that her class ranking was negatively influenced by her lowest grades, which were in math.

**Family background.** During our discussion, I got the impression that Dawn lived in a two-parent household. However, Dawn did not appear to have a close relationship with her father. She told me, “He does his own thing, and I do mine.” On the other hand, Dawn talked a lot about her mother’s influence in her choice to go to college. Dawn felt that because her mother had persevered and completed her bachelor’s degree, she should complete college as well. Dawn
said that her mother would occasionally help her with homework if she understood the subject. I also got the impression that Dawn was trying to set a good example for her sister.

**Aspirations for college.** Dawn was not a first-generation college student. She had the benefit of her mother’s experience, and she had watched her mother struggle to obtain her bachelor’s degree. Dawn told me that it took her mother 4 years to get her associate’s degree and 6 years to get her bachelor’s. Dawn was inspired by that dedication and knew she should attend college: “I watched mom going [to college] and I was like, ‘Well, hey, if she can do it, I can do it.’”

College cost was not a big issue because Dawn knew that she could receive financial aid. Her mother’s experience had benefitted Dawn because the family knew about financial aid and was aware of the application process.

Dawn did not have a strong relationship with the guidance office, partly because of turnover in the position:

I went through two guidance counselors. The last year, he was something else, he was a trip. He helped, but like he was slow. He was the worst one that we had. I mean, the woman before him was excellent. And she helped me up till she left. The other one took over and he was nowhere near as helpful as she was. He just didn’t know what he was doin’. I think he was in over his head.

I believe Dawn’s transcript reflects the inconsistency in guidance, especially where math is concerned. Because her math skills were poor, she should have taken more math, not less, in high school.

Dawn was aware of the administrative turnover at her school: “We went through two superintendents too. We went through three principals, two superintendents, and two guidance counselors.” Because of the turnover, Dawn knew she had to get information on her own and
work around the gap in information. She believed people were leaving because they were “gettin’ better jobs,” which is a reflection of how she felt about the jobs at her school.

When I asked Dawn about the perception she and her friends had of community colleges, she did not mention her friends, but told me that she had “heard too many horror stories about going straight from a high school to a 4-year school.” It seems that Dawn was once again influenced by her mother’s early experience at a nearby university, which turned out poorly because of a personality conflict with a roommate.

**Follow-up after 6 months and 1 year.** When I obtained Dawn’s unofficial transcript on August 25, 2010, and saw how she had progressed, I was pleased to find she was still attending school. She failed Intermediate Algebra in the fall of 2009 and retook it for the third time in the spring of 2010, when she passed it with a C. She was enrolled full time in the fall of 2010 and was taking a general education math course. Her cumulative GPA at the end of spring 2010 was 2.91/4.0. However, she was in her third year at the community college. The only other very poor grade on her transcript was a D in Music Appreciation. Because she had quite a few social science courses on her transcript, I assumed that she might be pursuing a degree in social work, as her mother had done.

**Lewis**

Lewis and I met in the lobby of the community college for his interview appointment and found an empty classroom that allowed us some privacy. He had volunteered for the interview but was very shy and quiet. Lewis is an African American male that had been recruited by the community college to play basketball and was from another state. His primary reason for being
in college was first, to play basketball and a second, to get a degree. He told me his major was general studies and that he just wanted to get the “basics” out of the way.

**Education.** Lewis graduated 45th in his class of 70, which placed him in the 64th percentile. He had 4 years of math in high school. He had Algebra I with a failing grade his freshman year, and he repeated the class his sophomore year with a low C. His junior year, he passed Geometry with a low C. In his senior year, he made it through Algebra II with a low C. Lewis struggled in math throughout high school, and even though he had 4 years of math, one was a repeat of the same class. He tested into Introduction to Algebra on the COMPASS test at the community college. Lewis also had low reading and English scores on the COMPASS test, and had to take remedial classes in those areas as well. Although the high school transcript supported Lewis’s deficiency in math, his English grades throughout high school were in the low B, high C range. The lowest grades on his transcript were in math. Lewis told me that he really did not like math and could not remember the classes he had taken in high school. He was not surprised at the placement test results for math in the community college.

**Family background.** Lewis was the youngest of his siblings and the first in his family to go to college. Lewis did not volunteer a lot of information about his family. I did not learn how many brothers and sisters he had. He did not say his parents were divorced, but his high school transcript lists his mother’s last name as being different from his father’s.

**Aspirations for college.** Lewis told me that his parents and his coach were instrumental in convincing him to go to college: “I was kinda discouraged about my grades. So they talked me into it, my coach and my parents.” Lewis spoke highly of his coach and looked to him for guidance about going to college. His basketball coach in high school guided Lewis through the financial aid application. Lewis’s parents were willing to support him financially to attend
college, and along with his athletic scholarship, the cost was not a deterrent: “They didn’t want me payin’ for anything. If I was to go to college, they wanted to help me pay for everything.”

Lewis’s main goal was to play basketball at the college level, and the education was a by-product. He initially set out to attend a university, and when I asked where the community college had fallen in the ranking, he said, “Like third, ’cause at first I had visions to go to Georgia State, but my ACT score wasn’t high enough, so I decided to come here.” His failure to get into Georgia State may have precipitated his lack of confidence in his grades and his reluctance to attend the community college. Lewis hoped to earn a good GPA at the community college and try to transfer to Georgia State after completing his associate’s degree.

When I asked Lewis about his circle of friends and their college aspirations, he said, “Well, not all my friends planned on going to college, but the ones that didn’t, they encouraged all of us to go to college.” Lewis told me that the person in high school that sent him the strongest signal about college was his best friend: “Me and him were good friends for years. And we always talked about going to college. He wouldn’t let me fail a class, and I wouldn’t let him fail a class. We always stayed on top of each other.”

Lewis had a good relationship with the guidance office at his high school and said that they were “pretty good”: “I went to them for everything. I talked to them about a lot of stuff.” In addition to the guidance office, Lewis told me about a math teacher that had answered many of his questions about what college would be like.

Follow-up after 6 months and 1 year. I interviewed Lewis on November 17, 2009. When I obtained his unofficial transcript on August 25, 2010, to see how he had progressed, I learned that he had failed Intermediate Algebra the first time, even though he had passed Introduction to Algebra with a C. He retook Intermediate Algebra in the spring of 2010 and
earned a D. During that same semester, he failed Biology and English Composition. He attended in the summer of 2010 and was enrolled in the fall of 2010. He had also taken College Prep Reading II and Basic Writing II in fall 2010 and had earned a C in both classes. Lewis had attended two summer semesters and seemed determined to graduate from MCC.

Marie

I arrived at MCC in the morning of October 19, 2009, and I was patiently waiting for students to come into their Intermediate Algebra class. Marie was the first to arrive. We began talking, and she volunteered right away to be interviewed. Marie is an African American female who had graduated from a high school about 1 mile from the community college. Marie said that she had moved to the area from Chicago, and some day she hoped to go back to the town she considers home. She indicated on her demographic form that she is majoring in business at the community college.

Education. Marie graduated 28th out of 38 in her class, which placed her in the lower echelon of her class, at the 73rd percentile in class rank. She took Prealgebra her freshman year and averaged a high C, based on my review of her transcript, and she took Algebra I and received a very low C grade in her sophomore year. Unfortunately, I did not ask Marie why she took no math classes her junior year even though her transcripts suggested she was already behind if her goal was to transition to college. In her senior year, Marie attempted Geometry but did not pass it. Even though Marie did not do well in high school math, her COMPASS test score placed her in Intermediate Algebra. Marie told me that the class was far too difficult for her, and she felt she had been misplaced. Her high school math course-taking would also suggest the course was more advanced than she was prepared to take. Marie observed,
No, they uhm, in high school, I guess they just tell you what you need to graduate and then they really didn’t prepare students to come to college. To, you know, what you would need, and so when I got here, they put me in Intermediate Algebra. You know, I wasn’t prepared for this; I was flunkin’ that class. I went back to a math class [Introduction to Algebra], and I made an A on that. In the Intermediate Algebra class I’m in now, I have an A in that. If they had have prepared me, then I would have done good the first time.

The semester I interviewed her, Marie was taking Intermediate Algebra for the second time after she had successfully completed Introduction to Algebra. She did not require remediation in English or Reading at the college level. I believe Marie’s comment, “If they had have prepared me,” refers to the advisement she received when registering for college. But it also goes much deeper than that. If Marie had been properly prepared in high school, she may have been successful the first time in the Intermediate Algebra class. She did not get signals from her high school guidance counselor that pushed her to take math her junior year because she would need those math skills in college. Marie was failed yet again at the community college by her advisor because her high school transcript clearly indicated that she was not prepared for Intermediate Algebra.

Marie’s high school transcript indicated that in other disciplines, she earned grades of A’s and B’s. Her overall rank in the class was negatively influenced by her math, but also by physical education (PE). I did not notice the low grades in PE until later, when reviewing the transcript. She was excused from taking PE her junior year, and she had F’s her sophomore and senior years.

**Family background.** I am not certain how Marie came to this rural area from Chicago (I neglected to ask her this question), but I can only imagine the magnitude of the change from the urban environment of Chicago to rural downstate Illinois. And even though the move happened when Marie was around 4 years of age, she still talked about moving back to Chicago. I believe
Marie’s parents are still married, and she is the oldest child in her family, but she did not indicate how many siblings she has. Marie was the first in her family to go to college, and she described her parents as being quite proud of her.

**Aspirations for college.** Marie said that her parents “have always instilled, you know, that you should go to college and stuff.” When I asked Marie if her parents had been active in helping her plan for college, she shared with me that it was her father who had accompanied her to the community college to register. She said,

> Like, my Dad was there with me when I filled out my papers. He wanted to make sure I was taking the right classes and going at the right time so I wouldn’t slack off. But they don’t really know anything about it, but they’re behind me to push me.

Despite their lack of firsthand knowledge of going to college, having parental support to attend college was important to Marie.

Making the decision to go to college was not an easy one for her or her family, however. Marie reported on her demographic form that her family income was in the $10,000 to $25,000 range. Marie said that her parents were concerned about the cost of college and that she had decided not to go because she did not want that burden of debt for her family. She said,

> It’s [college cost and family income] always been a concern, but I didn’t know they had financial aid offered. ’Cause that’s what I’m on now, and they pay for it fully. So, they wanted me to go but I’m like, well then, we will be in a big hole by the time I get out of college. So I was not gonna come because I didn’t have no way to pay for it, and I didn’t want that to be over my parents’ head. But then when I found out about the financial aid, you know, it was a plus.

It is sad that Marie did not learn about financial aid until very late during her high school tenure.

Fortunately, the community college sponsored a financial aid night at Marie’s high school, and Marie and her father attended.

Marie’s relationship with the guidance office was not good. She said she did not feel comfortable there and felt she was “getting nowhere.” She gave an example of when she had
requested that a transcript be sent to the community college, and it had been overlooked by the counseling staff. Marie was quite upset and thought they should have been more helpful.

Marie identified her superintendent as being the most influential person in high school that prepared her for college:

And she was just, if you need help, like writing to win for a scholarship, she would help you. You would come in before school or after school, and she would help you. She would take the time out to devote it to those students who wanted to go farther.

This superintendent sent a strong signal to Marie that college preparation was important and that she would support students. This superintendent put students and their college preparation at the top of her priority list.

Marie’s peers sent her a signal that college was the best choice for her future, not necessarily because the education was so important, but because there were no other choices after high school graduation: “They were all, ‘It’s just right there, you should go. What else are you gonna do?’” She said that most of her friends were attending the same community college.

Follow-up after 6 months and 1 year. I interviewed Marie on October 27, 2009. When I obtained her unofficial transcript on August 25, 2010, to see how she had progressed, I was delighted to find that she had earned a B in Intermediate Algebra. She had taken Introduction to Algebra the spring before and received an A. In the summer of 2010, Marie took Geometry and received a B. She continued to enroll in business classes and seemed to be on track to complete her associate’s degree. Marie’s grades in math at the community college seemed to indicate that she had the ability and could be successful in math.
Michelle

I recruited students in an Intermediate Algebra class taught via distance learning, and students at a remote site also volunteered to participate in my study. Michelle was a Caucasian female who volunteered readily, and I offered to drive the 30 miles to meet her at the satellite location, 40 miles from the main campus. We struggled to find a time that worked for us both, but eventually we were able to connect. Michelle was in her second year at the community college and had taken Introduction to Algebra in the fall of the previous year. Michelle eventually hoped to transfer to a university.

**Education.** Michelle graduated 24th out of 49 in her class, which put her in the 50th percentile. She had struggled with math during high school. In her freshman year, she was placed in a Passport Algebra/Geometry class and had a B average. In her sophomore year, she passed Prealgebra with a B. Michelle did not have Algebra I until her junior year, and she had a C average. Michelle had Geometry her senior year and had a C average. She tested into Beginning Algebra on the placement test at the community college. Michelle told me that she did not like math and did not try very hard in high school. She described herself as a “slacker in math class.”

When I asked Michelle what would have motivated her to do better in math and high school in general, she responded,

> I think maybe if they would have been like “get your act together because you’re gonna have to be doin’ so much more when you’re in college,” that would have probably helped. I think there were a lot of students that were actually like in my level, you know, like they were part of a few students that were just in the regular math classes, no big math classes.

Michelle described one of her math teachers as “like I know how to do this, why don’t you?” She went on to say that she had this teacher for 2 years and after she moved on to another teacher,
she did a lot better in math. Michelle also said her teacher would get angry if the students did not understand what he was talking about.

**Family background.** Michelle’s parents did not attend college, but they encouraged her to go. Michelle’s mother was especially adamant that she attend college. She had a sister who had just transferred to a university, but when I asked Michelle how helpful her sister had been, she did not respond positively. Michelle said that her sister was familiar with financial aid and assisted her with the application. Other than this basic information, I did not learn a great deal about Michelle’s family. I gathered from our conversation that Michelle came from a two-parent family and that there were only the two daughters.

**Aspirations for college.** Michelle seemed determined to go to college and had her parent’s support and encouragement. She seemed committed, even though her math placement required her to take two remedial math classes before she would be able to take a class that counted toward her degree. When I asked Michelle about her friends, she indicated that they had all gone to college, with the exception of one. She said her friends had mostly gone to community colleges.

However, in high school, Michelle did not think about college very much. She said she did not really begin to plan and consider how her course work in high school would affect her transition to college until her senior year. When I asked her if counselors had played a part in her decision or preparation, she talked about the counselor giving them pamphlets in her freshman and sophomore years. Michelle felt options such as dual enrollment were not “pushed” or encouraged, which she thought would have inspired her.

Michelle knew that the opportunity to attend college was always available to her because of the community college in her area. She said, “It’s a lot easier to go someplace close. I never
really thought about going anywhere else ’cause I don’t really want to move. Yeah, I always knew it would be this community college.”

**Follow-up after 6 months and 1 year.** I interviewed students in November 2009 and January 2010. The college allowed me to request an unofficial transcript on August 25, 2010, to see how the students had progressed. At that time, Michelle was not enrolled. Her transcript showed that she had completed a full load of courses in the fall of 2009 and enrolled in one class for the spring of 2010. Michelle had taken Beginning Algebra in the fall of 2008 and received a B. She completed Introduction to Geometry with a B in the spring of 2009, and she had received a D in the Intermediate Algebra class she was enrolled in the fall that I interviewed her. Her cumulative GPA upon leaving was 2.88.

**Nicole**

Nicole is a Caucasian female who was reluctant to be interviewed but was persuaded by her instructor. Nicole was very shy and talked in a soft voice that was at times difficult to hear. She was challenging to draw out, and she tested my interviewing skills. Nicole was majoring in engineering and planned on transferring. She devoted her time to her studies and was not currently working. She told me that she had chosen engineering because her high school Calculus teacher believed she was gifted in math, and Nicole liked math, particularly Calculus.

**Education.** Nicole graduated 8th out of 21 in her class. When I reviewed her high school transcripts, it appeared she had struggled with English. She had passed, but English was among the lowest grades on her transcript. I was puzzled, however, because in Precalculus her junior year, she had received a C– and a D, respectively. When I questioned her about this, she replied, “It was harder than Calculus. See, I didn’t like triangles, and that’s my problem in Precalculus,
but in Calculus I understood it better.” Her senior year in Calculus, she had a B− and an A−, respectively. Based on her teacher’s assessment of Nicole’s math ability, this is an incongruent finding because of her placement in Intermediate Algebra in the community college. Her community college math instructor indicated that she thought there were “holes” in Nicole’s math education. The instructor attributed that to various teaching styles among her high school teachers and the possible deficit in their high school math teacher training. I asked Nicole if she thought her teacher had anything to do with her level of understanding between Precalculus and Calculus, and she replied, “No, I don’t think so.” I was looking for Nicole to indicate that the Calculus teacher explained things better, but her response indicated that she believed her math ability was better in Calculus.

Nicole had tested into Beginning Algebra and was very frustrated by that. She retested several times in an effort to improve her math score but was not successful. She thought the test was easy and could not understand why she did not pass it: “Well, I was a point away from college math. Every time I took it, I was a point away.” Nicole was confused about the math hierarchy because she had to take Beginning Algebra before Intermediate Algebra. She finally resigned herself to taking the recommended algebra course.

**Family background.** Nicole came from a family with very supportive parents and was an only child. Her mother was a teacher, and her father had just completed 2 years at the community college and was self-employed. Even though Nicole’s parents were supportive, they did not assist her in planning her classes in high school.

**Aspirations for college.** When I asked Nicole what grade she was in when she started thinking about college, she replied, “I knew I was gonna go to college since I was little. I don’t know. Everyone that knew me knew I was gonna go to college.” Nicole’s parents were
instrumental in her decision to attend college. Her mother is a teacher, and in Nicole’s words, “She still don’t make enough money to support us.” Her father’s recent return to college to obtain a career-technical degree was also influential. Both parents sent her the signal that a college degree was a ticket to self-sufficiency. Nicole’s parents instilled in her the desire to attend college.

College cost was a topic in Nicole’s family, but they sent her the signal that it was possible: “We’re gonna get loans when I go to a 4-year [college].” Even though Nicole did not qualify for financial aid, she had received an academic scholarship based on her high school GPA, which paid for tuition. She indicated earlier that her parents struggled with finances, and apparently her father had returned to college to gain a skill for employment. I believe that having family knowledge of college removed the worry of cost for Nicole. In addition, Nicole told me that the community college had come to her school and held a financial aid night to see if students would qualify. She knew that she could get loans when she transferred to a 4-year institution.

When I asked Nicole about her friends’ college expectations, she indicated that most members of her class had gone to college. Because her class was so small, 22, she knew that three had gone on to universities, but the rest had come to the community college. Nicole was not as influenced by her friends’ choice of institution as she was by the cost. She observed, “It’s just cheaper.”

**Follow-up after 6 months and 1 year.** I interviewed Nicole on October 27, 2009. I requested an unofficial transcript on August 25, 2010, to see how she had progressed. She had made A’s in Introduction to Algebra, Intermediate Algebra, and College Algebra. Her cumulative GPA was 3.64/4.0 at the end of summer 2010. Even though Nicole was a C student
in English in high school, she made A’s in college English. She appeared to be on track for graduation and had a full load for the fall of 2010. I did notice, however, that she was enrolled in Math for Elementary Teachers, which might indicate that she had changed direction and was pursuing a different major.

Patricia

Patricia had volunteered right away to be interviewed. I met Patricia in a conference room at the community college. She was a serious young Latina who talked openly about her college expectations and experience. Patricia was a business major, and she later shared with me that she hoped someday to own a business. She was not interested in moving from the area, and she had plans to own a restaurant and gaming parlor that would provide her community, particularly the youth, with entertainment.

Education. Patricia graduated 10th in a class of 45. She had 3 years of math in high school: Geometry her freshman year, Algebra II her sophomore year, and Trigonometry her junior year. In Geometry, she earned a solid B, in Algebra II a high B, and in Trigonometry an A. Patricia had taken no math her senior year, but had taken Chemistry and earned a solid B. Even with the time lapse in math, Patricia placed into Intermediate Algebra, and she demonstrated ability in math. I wondered where she would have placed on the test if she had taken math her senior year.

Patricia appeared to be well prepared for high school math because of a math teacher she had in the eighth grade who, Patricia said, “actually explained the work to us.” Patricia mentioned several times that math came easily to her. Patricia’s comment about Geometry was especially interesting: “And then I went to Geometry, and it was hard because I didn’t like the
teacher. And she was confusing, always screaming at us ’cause of something ’cause we couldn’t understand it.” As Patricia continued to talk, she told me that the Geometry teacher had tried to teach them at a college level but was not effective:

She had us show our work and explain the answers. She was also kind of confusing because she wouldn’t actually sit down and do a problem. She would just show you the basics of the problem, and it got us all confused and we always got in arguments with her.

During Patricia’s junior year in Trigonometry, the teacher left midstream and students had to adjust to another teacher. At first, Patricia told me that the teacher’s departure was not harmful, but later in the interview, when we talked about COMPASS test scores and her performance in math, she said, “It made me feel like they needed to teach a better math class and quit changing teachers on us.”

**Family background.** Patricia’s Hispanic heritage exemplified strong family ties. She shared a story with me about how she had ended up in college:

I kinda got tricked into going to college. What had happened is that the guy that I’m dating asked my dad if he could marry me and my dad said the only way we can have his blessing was if I have 2 years of college.

It is difficult to imagine that a young woman of today would honor her father’s request and postpone her marriage until after 2 years of college. Patricia indicated that she wanted to attend college anyway, but I do not believe she would have married without her father’s blessing, which is a strong testament to her family culture. Patricia reported a family income of less than $10,000.

**Aspirations for college.** When I asked Patricia if she discussed college admission requirements with anyone, she told me,

Well I tried going to my sister and my parents first and foremost. But my mom isn’t all big on this college stuff and she didn’t really understand it. And my two sisters that went
to college, one of them is actually going to this one, she’s so busy she couldn’t give time enough to give me any attention. And the other one, we don’t really talk.

Even though Patricia’s mother was not encouraging and her sisters did not help her, Patricia’s father used 2 years of college as the precursor to marriage.

Patricia’s other inspiration for attending college was her desire to own a business. She wanted to open a restaurant in her hometown with an arcade because “there’s nowhere to go to have fun.” Patricia shared that many of the youth were getting into trouble, and she felt it was because they had nothing to do. Her sense of community was admirable.

**Follow-up after 6 months and 1 year.** I interviewed students in November 2009 and January 2010. The college allowed me to request an unofficial transcript on August 25, 2010, to see how the students had progressed. Patricia was still enrolled but had failed several classes. She had completed Intermediate Algebra with a C, but the following semester she had failed all her classes. In the summer of 2010, she received C’s in two classes and failed the other one. She was enrolled full time for the fall of 2010. I was disappointed to see Patricia’s grades and her subsequent low cumulative GPA of 1.4/4.0 at the end of the summer semester of 2010. The information I had gathered about Patricia’s academic record indicated that her poor performance at the community college was due to other factors. She had several F’s on her college transcript, and I wondered if she had just failed to withdraw from them, not understanding the influence this would have on her GPA and how difficult it would be to expunge them.

Patricia did not have a good relationship with the high school guidance office until her senior year, and even then, she expressed difficulty with getting in to see the counselor:

Well, it wasn’t until last year that we had a very good guidance counselor. If you were lucky enough to get her when nobody else was there, it was surprising. You always had to have a meeting with her or you wouldn’t be able to get her. I was there like once every week tryin’ to get some information that I needed, but she was pretty busy, especially
since she was one of the ones that actually would try to help people. ’Cause our guidance counselor before, yeah, she was crappy.

This could explain why Patricia did not take math her senior year, because her schedule would have been made before the arrival of the new guidance counselor.

**Rena**

Rena was a Caucasian female and the first student I interviewed. She readily volunteered and was pleasant and friendly. We met in a conference room at the community college for her interview, and she arrived early for her appointment. Rena was an athlete and had been recruited from another state to come to this community college to play basketball. Even though Rena wanted a college education, it was apparent that her interest in sports guided her decision about higher education. Rena was majoring in education with the intention of becoming a coach.

**Education.** Rena graduated 39th out of 117 in her class, which placed her in the upper 25th percentile of her class. She had taken 4 years of math in high school: Algebra I with a B average her freshman year, Geometry with a B average her sophomore year, Algebra II with a B average her junior year, and Algebra III with a B average her senior year. It was discouraging that even though Rena had college preparatory math in high school, she had placed into Intermediate Algebra at the community college. It is worth noting that she had taken several AP courses in English but had also placed into a remedial reading course. Rena felt math was fairly easy for her and mentioned that her only challenge had been Algebra II, but she thought that was because of the teacher. Rena’s comment about the teacher was, “’Cause the teacher was really smart, like way too smart to teach us.” She went on to say that when she moved on to Algebra III, she understood it and did well with a different teacher.
Rena thought her community college placement scores might have been influenced by her lack of sleep. She lived several hours away and had gotten up very early and driven in the morning of the test. She did not, however, contest the math or reading placement and had a good attitude about taking the classes: “I’m kind of glad I took it because it’s like just getting me ready for everything else I have to take.”

**Family background.** During my conversation with Rena, I learned that she came from a divorced family background. Her father had attended what she called a “vocational college” and her older sister was at a university. The expectation from her parents was that Rena would also attend college. She mentioned that her parents’ marital status had helped her qualify for financial aid. Rena did not mention her sister mentoring her through the college application process. However, Rena and her parents knew about financial aid, in part because her sister had already been through the process.

**Aspirations for college.** When I asked Rena at what point she became serious about going to college, she told me it was not until the 10th grade:

> Probably my 10th grade year ’cause that’s when everything starts to really count. That’s when I started to get . . . I didn’t have a really hard time with grades in high school. I guess you could say it was easy. I don’t know, I just figured everyone goes to college. You don’t think about who will and won’t go. And my sister went, so I just thought that I needed to go too.

Rena knew that it looked “way better” to colleges if you were an honors grad, so she set that as a goal for herself while in high school. She had four AP courses, and at this point, she contradicted her earlier acceptance of her remedial placement:

> That’s why I was really surprised I got put in an Intermediate Algebra class. But I don’t know, my test scores aren’t very good. I just have trouble takin’ tests ’cause I was also put in an Intermediate Reading class. And I had AP lit and AP comp, you know, so I just like, I don’t know. It kind of made me think I didn’t really need to take those classes.
I do not believe Rena shared any of this with a college advisor, which is unfortunate because she might have taken the placement test again and placed higher in math and reading.

Rena’s relationship with the high school guidance office was not strong. She talked about not feeling very welcome there and how she was always referred to a filing cabinet when she asked questions. When Rena wanted guidance and encouragement, she went to her softball coach. Rena said that she felt more comfortable talking to her coach about college and that the coach had helped her fill out her scholarship applications and get references.

Rena’s friends were all athletes, and when I asked if they had influenced her decision to attend college, she said, “Yes,” that it was an expectation. That is how she had come to this community college. Two of her friends were playing basketball there and convinced Rena to come along.

**Follow-up after 6 months and 1 year.** I interviewed Rena on October 26, 2009. When I obtained her unofficial transcript on August 25, 2010, to see how she had progressed, I learned that she had earned a C in the Intermediate Algebra class. She was enrolled full time in the spring of 2010 and had earned a C in General Education Mathematics. That was her last semester at the community college. When I checked her grade in the College Prep Reading II course, she had made an A. Her placement based on the COMPASS test scores seemed suspect based on her subsequent grades in the remedial classes, especially reading.

**Shawn**

Shawn is a Caucasian female who volunteered readily and appeared very confident. During the interview in a conference room at the community college, she talked openly and seemed to be relaxed. She was majoring in business and had no aspirations to transfer. Shawn
did her boss’s books and deposits and enjoyed that type of work, which led her to pursue an applied degree in accounting.

**Education.** Shawn graduated 11th out of 45 in her class. She had taken 3 years of math in high school: Algebra I her freshman year, Geometry her sophomore year, and Algebra II her senior year. In Algebra I she had an A average, in Geometry a B average, and in Algebra II an A average. Even with the time lapse in math and her family circumstances, Shawn tested into Intermediate Algebra. When we discussed her math teachers in high school, she thought she had a good teacher for Algebra I: “She was real old school, like she was old in her ways of teaching, but they were easier for me to comprehend, I guess.” However, Shawn felt that she did not learn anything in Geometry. Her teacher did not grade homework or give her feedback. During Algebra II, she had a “very good teacher.” However, he left halfway through the year and the school was unable to find another math teacher: “And so for the rest of the year, the school didn’t have us no teachers. We were just watching movies or they would have a substitute in there.”

Shawn philosophized about her learning: “If I don’t like the teacher, I’m not going to do good in it because it just doesn’t help me at all.” She went on to say that her Intermediate Algebra teacher was dry and boring. She used the study guide to show her how to do the problems, and said she slept through all the classes.

**Family background.** During my interview with Shawn, I learned that she had been on her own since she was 16. Shawn’s mother and several younger brothers moved to Kansas during Shawn’s junior year, and she decided to stay behind. Shawn’s mother did not contribute any money toward her support. Shawn said, “She doesn’t hardly make enough to take care of herself, let alone help me.” To support herself, she worked full time and lived with her boyfriend.
Between them, they had one vehicle, which proved problematic at times and caused Shawn to miss school. Shawn felt that the administrators could have been more supportive during her high school years, but I did not sense any bitterness in her. She was a very confident and strong young woman:

I’ve had a lot of teachers tell me that they’re proud of me for coming to college, you staying in high school and just not dropping out of high school. They couldn’t believe my mom would leave me like that. They were proud that I was still going. The principals and stuff, they didn’t seem to care the situation I was in. My teachers were more lenient. Like if you missed a day of school, you just got a zero for that day and it would hurt your grade. I couldn’t always make it to school because I had to hold down a full-time job. And they just didn’t care. They didn’t care the situation I was going through. Or if I was sick or something. I only had one vehicle and it was mine and my boyfriend’s vehicle and he would have to drive me to the doctor because we couldn’t . . . they didn’t care. They would not excuse anything. They just did not care the situation we were in.

Shawn told me that her father was not active in her life and that no other family members were helping her. On her demographic form, Shawn listed her mother as having less than a high school education and her father as being a high school graduate.

**Aspirations for college.** When I asked Shawn what grade she was in when she started thinking about college, she replied, “Pretty much my entire school life, I was thinking I was going to go to college. It’s just something I figured I needed to do.” She said that her mother wanted her to go to college, yet left her to fend for herself at the age of 16. Shawn’s father was not a part of her life. Yet Shawn had the goal of attending college and the drive to do it. She told me her biggest concern was how to pay for college. Considering her mother’s financial situation, Shawn knew that she would have to pay for college herself. Once she discovered that she was eligible for financial aid, however, she said, “They helped explain to me, you only make this much; we can give you money for that. It will help you get to college if that’s where you want to go.” I was amazed that she had accomplished alone what most students have difficulty with even with parental support. In her words,
I didn’t know there was such things as financial aid until a community college representative came and explained about the FAFSA and stuff. So I was like, yeah! Yeah, that I was gonna be able to afford it. That was really nice.

This is also a great example of the service the community college is providing to the area high schools. Shawn was paying attention, and that paid off for her with a solution to her college financial concerns.

When Shawn and I talked about her circle of friends and their college expectations, she said, “Yeah, pretty much all of us were going. Some of us were coming to this community college and some of us were moving states away just to go to college. So we all pretty much went to college.” When I asked if her friends were influential in her decision to attend the local community college, she indicated that it was because it was close to home and cheaper: “I don’t like driving far. I don’t like leaving home. I don’t want to go anywhere, so I like staying here in this general area.”

**Follow-up after 6 months and 1 year.** I interviewed students in November 2009 and January 2010. The college allowed me to request an unofficial transcript on August 25, 2010, to see how the students had progressed. I was disappointed to find that Shawn had apparently dropped out in spring 2010. She had successfully completed the fall semester of 2009 and received a C in Intermediate Algebra. The next semester, she was enrolled in courses toward her applied accounting degree. The transcript shows F’s for each of the four classes in which she was enrolled. Because of Shawn’s previous academic record, I believe she quit attending for some reason. Students who do not understand the consequences often quit attending without withdrawing. If they return, they find what damage they have done to their academic record.
Chapter 5

Results

This chapter discusses signals to students about their readiness for college-level mathematics. The signals are captured in six themes that students identified through one-on-one interviews. I used signaling theory as a lens through which to understand their transitions from high school to community college, their placement in remedial mathematics, and their enrollment in Intermediate Algebra, a class below the college-level mathematics threshold. Data collected through one-on-one interviews with 10 students were analyzed and summarized to answer the second research question, “What phenomena do students interpret as signals about their readiness for college-level mathematics, and what is their understanding of how these signals have influenced their college transition?”

Spence (1973) defined signaling as a way that educational credentials convey to employers the skill levels of new employees. In his theory, an educational credential is easy for an employer to recognize, but not all signals are readily discernible by the receiver. For example, despite students’ active participation in the educational process beginning in kindergarten and extending through high school, they may not understand how the educational process contributes to their preparation for college; they may not recognize signals about their readiness to continue beyond the K-12 education level. What constitute signals and how signals are conveyed to students while they are in high school may influence the decisions they make and the behaviors they engage in when they transition to college. Thus, signals that emanate from the educational process, from many different places and in many different forms associated with high school in particular, may influence students’ decisions about and behaviors in their transition to college.
Kirst and Venezia (2004) drew upon Spence’s signaling theory to examine signals they believed influenced the decisions and behaviors that students make as they pursue their education. Their study proposed that educational policies send signals to students, and they also argued that policies governing curriculum alignment (or lack thereof) from K-12 to college signal what students need to know and how they need to perform to be ready for college. From their perspective, public policy on education should convey an educational message (or signal) that positively influences students’ decisions and behaviors concerning college preparation and college enrollment. However, policies may influence students’ preparation for college even when they do not fully understand how they work. Undoubtedly, students experience education in many different ways, and they interpret their experiences through a multitude of lenses. They may or may not understand how policies as abstract as curriculum alignment affect college preparation, but they do ultimately understand whether they are prepared for college. When students fail the community college placement test and are placed in remedial mathematics, they receive a clear signal that they are not prepared for college. What signals students receive about their preparation in mathematics when they are still in high school and how they interpret those signals are the foci of this chapter.

This chapter explores signals related to students’ preparation to transition to the community college in mathematics, with the data collection focusing on students’ interpretation of their educational experiences in high school mathematics courses and their self-assessment of their preparation for enrollment in an Intermediate Algebra course offered by the community college. The definition of *signal* that I used in this study was that a signal is a message (direct or indirect) that students receive that influences their thinking, decisions, actions, or behaviors concerning their preparation to enroll in college-level mathematics. I came to understand the
students’ interpretation of the signals associated with their high school mathematics courses and college preparation through one-on-one interviews, which provided me with insights into their personal experiences.

Through my interviews with students, I deduced that many signals associated with mathematics were by-products of a policy or action that was undertaken by someone else, for example, a mathematics teacher, a guidance counselor, an athletic coach, or a school administrator, and they often also had an unexpected outcome. These signals were abstract and indirect in nature, yet they had a potentially powerful influence on students’ decisions and behaviors. For example, the anger of a mathematics teacher in a high school classroom was interpreted by some students as a signal that they were incapable of learning mathematics. Although the teacher’s wrath may not have been intended to signal to students that they were incapable of learning mathematics, the students were left with the impression that they were incompetent learners, and this perception had a lasting influence for some. Another example of an indirect signal was the lack of resources to support students’ schooling in their rural communities. Poverty was a reality for the students in my study, and it created numerous barriers to their preparation in mathematics through the turnover of high school personnel, the lack of college-preparatory courses in mathematics (and other subjects), and the lack of family support to take college-preparatory courses.

It should be noted, however, that not all signals were vague and indirect. Some signals were clearly conveyed and readily received by students, and they influenced students’ decisions and behaviors in important ways. An example of a clear and compelling signal about college preparation that was mentioned by several students was an English teacher’s classroom discussion about the need to prepare for college and the necessary steps that students should take
to be adequately prepared to enroll. Several students identified the English teacher’s classroom as the place where they received clear signals about college preparation that helped them transition to the community college.

This chapter is organized into six categories of emergent themes about signals:

1. Placement and performance in mathematics;
2. High school guidance;
3. Mathematics teacher impatience;
4. Mathematics instruction engagement;
5. Lack of K-12 resources in relation to mathematics instruction; and
6. “Someone to push you” in high school.

Together, these themes portray a picture of the signals that students received about high school mathematics and their preparation to transition from high school into college-level mathematics at the community college. I used information gathered from one-on-one interviews with students as my primary data source, and I used information gathered from high school and community college faculty and administrators to triangulate with the students’ interviews to make sense of the signals they identified.

**Placement and Performance in Mathematics**

This theme refers to the perceived misplacement by students in a high school mathematics class based on their belief that high school courses were either too easy or too difficult for them. *Misplacement* is defined in this study as students’ being required to take a mathematics course that was either above or below their perceived ability level. A result of misplacement was that students were bored if the class was too easy and frustrated if it was too
difficult. Misplacement also signaled to students that their high schools were not managed in ways that facilitated their learning, including providing information that would prepare them for college. For example, some students perceived that they were misplaced in a high school mathematics course, and they interpreted this misplacement as a result of incompetent advisement. This misplacement could have occurred because the students were not advised properly on what mathematics courses to take, because the high school and community college curricula were not aligned, or because of other factors not accounted for in the students’ depictions of their high school experiences. Nonetheless, a universal result of misplacement was that the students felt inadequately prepared in math, and they were discouraged by these experiences.

Misplacement in the mathematics curriculum in high school extended to the community college. A contributing factor to students’ perceived misplacement in the community college mathematics curriculum emanated from their mathematics placement test scores and their perception that the exams were not assessing their mathematics skills in a way that was logical or accurate. The students interpreted their misplacement in remedial math as a lack of commitment to their education, and specifically to their need to learn mathematics while in high school. Four students were selected to explain this theme because they spoke about their perceived misplacement in the high school mathematics curriculum and how it affected their experience with mathematics in the community college. Their experiences helped to explicate the themes of misplacement and performance in mathematics.

The first depiction is of Nicole, whose experience with mathematics demonstrates the confusion and frustration that students face when the high school’s assessment of a student’s performance in mathematics does not align with the student’s own interpretation of his or her
performance. Nicole is a student whose experience with high school mathematics seemed to have been positive because, according to her high school transcript, she was an average student her first 3 years in mathematics and did well in Calculus her senior year. Nicole received an average grade of C in Geometry her freshman year, in Algebra II her sophomore year, and in Pre-Calculus her junior year. Although not a stellar performance, Nicole received average grades, and she perceived that she was a competent mathematics student. She liked mathematics, and she decided to take Calculus her senior year of high school. She believed Calculus was her forte, and she eventually chose to pursue a degree in engineering because of her mathematics performance in her high school Calculus class. Receiving a high B, Nicole interpreted her Calculus grade as a clear and direct signal that she was ready for college mathematics. However, this was not the case. When Nicole took the community college placement test, she tested into Introduction to Algebra only. At the time of our interview, Nicole had advanced to Intermediate Algebra at the community college. When asked if she thought the difference in mathematics teaching styles from her freshman to her senior year of high school had anything to do with her sudden improvement and success in calculus, she said, “No.” Nicole explained that her Calculus class had only three students, and she implied that the small class size contributed to her ability to do well in the class. Later, as I reflected on my interview with Nicole, I wondered if the lack of rigor of her Calculus class might have contributed to her grade because she had been an average mathematics student earlier in high school.

A second vignette, from Bea, suggested that the advice of a guidance counselor can stifle students’ interest in mathematics and signal to them that they are incapable of learning it. Bea mentioned a time when she wanted to take an Algebra I course during her freshman year but was discouraged from doing so by her high school guidance counselor:
I think when I first started, it was my freshman year, the Prealgebra, I wanted to go ahead and go into Algebra I, because that’s what most high schools do, freshman year, Algebra I [is] mandatory. And I wanted to stay on that level, and she [the guidance counselor] didn’t let me take it, and I had Prealgebra, which I made . . . I had 97 or 98 average through like the whole year, which I felt was kind of a waste of a year of math for me.

My review of Bea’s high school transcript confirmed that she had a 98 average in Prealgebra her first semester as a freshman and a 95 average her second semester. She believed that her performance in Prealgebra provided a clear signal that she should have been placed in the Algebra I class her freshman year rather than the Prealgebra class. Bea also observed that in her junior year, her guidance counselor had misplaced her in a lower level mathematics class than she was capable of taking. She explained,

I wanted to take a different [more advanced] mathematics class, and she [the guidance counselor] wouldn’t let me. She thought I was placed too high, but the class that I had before was, like I said, not a challenge at all.

Bea’s transcript showed that she began her freshman year with Prealgebra and that she took Algebra I her sophomore year, Geometry her junior year, and Algebra II her senior year. She received a solid B in Algebra I, a high C in Geometry, and a low B in Algebra II. Bea’s perception of being misplaced in mathematics followed her into college and undoubtedly contributed to her lack of college preparation, as demonstrated by a college mathematics placement test score that placed her in an Introductory Geometry class even though she had completed Geometry in high school with a grade of C. What Bea did not seem to understand is that a grade of C in high school Geometry did not equate to college-level preparation in Geometry. In my interview, Bea also revealed that she did not feel equipped to challenge her mathematics placement test score at the community college or to advocate for herself.

A third vignette showed that patterns of mathematics course-taking that varied from what Treisman and Cullinane (2010) called the normative mathematics course sequence (i.e., Algebra,
Geometry, Trigonometry, Calculus) left students confused about their mastery of mathematics. Skipping courses in the mathematics sequence created holes in the students’ knowledge of mathematics that had a detrimental effect on their preparation for college mathematics. This problem was evident in Dawn’s high school transcript, which revealed that she took Prealgebra her freshman year and received a C, Algebra I her sophomore year and received a C, no mathematics her junior year, and then Algebra II her senior year and received a grade of D. As a result, Dawn had a gap in her mathematics course-taking that left her without any mathematics course from the end of her sophomore year to the beginning of her senior year. Given her pattern of mathematics course-taking, I was not surprised that Dawn made a grade of D in Algebra II her senior year. According to my interview notes, Dawn’s experience was also complicated by having had three different guidance counselors in high school, which may have contributed to the gap in mathematics her junior year.

In a fourth example, Patricia’s mathematics course-taking included skipping mathematics her senior year, a common pattern among high school students in the United States (Ingels, Dalton, & LoGerfo, 2008). Ingels et al. reported that in 2004, 34% of high school seniors did not enroll in any mathematics courses, and this lack of senior coursework created a gap in college-level preparation in mathematics. This vignette is particularly unfortunate because Patricia excelled in Trigonometry her junior year, receiving a grade of A. When I asked Patricia about whether her mathematics teacher or a guidance counselor had advised her to take mathematics and about the potential consequences of omitting mathematics in her senior year, she said she had not been advised to take mathematics as a senior.

In summary, when students experienced some form of misplacement in the mathematics curriculum, whether at the high school or community college level, they were confused and
frustrated. They perceived misplacement in mathematics as a signal of their inability to perform in the mathematics classroom, and this misplacement added to their lack of confidence in their mathematics ability. A particularly disturbing consequence of the misplacement signal was not one that the students could voice or perhaps even realize, but one that became evident when they took the college placement test and learned that they were not prepared to take college-level mathematics, an effect that cost them time and money. As one of several remedial courses offered by community colleges, Intermediate Algebra does not count toward a college degree, so it is an additional course that students must complete before they can enroll in a college-level mathematics course required for their chosen degree.

The students did not seem to understand the importance of mathematics while they were attending high school or the importance of the community college mathematics placement exam. High school transcripts revealed that the course-taking patterns of some students did not follow the normative course sequence, which affected their readiness for college-level mathematics. In addition, two of the students did not take mathematics their senior year, which may have influenced their recall and performance when they took the community college placement exam. In a recent study, Venezia, Bracco, and Nodine (2010) recommended that high school students be assessed early and often during high school and that their high schools target them to receive information about transitioning to a community college. This recommendation makes sense because the students I interviewed did not seem to understand the importance of the placement exam or the consequences of being placed in a remedial mathematics course. I placed this theme first because I believe addressing misplacement in the mathematics curriculum and counseling students to develop a strategy for mathematics course-taking in high school are crucial to improving their success in the community college.
High School Guidance and Counseling

Although the guidance process would seem to be one of the most obvious ways to signal to students their preparation for college, the high school students in my study did not believe their high school guidance departments had contributed to their college preparation or planning for college. Most experienced a very limited time with guidance staff, and they processed the lack of attention from counselors as a signal that they were not college material. Even though the students’ comments regarding guidance were typically not explicitly about mathematics, these students did not have confidence in their high school guidance personnel to prepare them for college. Six of 10 students did not use the guidance office at their high school at all, citing inattention from staff or discomfort with approaching staff to ask for help. Two students pointed out that the guidance counselors were more focused on students attending universities than students like themselves, who intended to enroll in a community college.

It is interesting to note that despite the pattern of limited or poor guidance, most students were reluctant to say that their guidance counselors were inadequate. Four students mentioned that their counselors did not have (or make) time to meet with them or provide adequate information about college. For example, Rena said, “I guess she had a lot going on. She just wasn’t really helpful.” She went on to explain that she and other students were referred to a filing cabinet in the guidance office to find materials for themselves, and she felt frustrated by this advice. Similarly, Michelle, who attended a different high school, mentioned that her guidance counselor was always giving students pamphlets, as though a piece of paper was adequate advice to prepare for college. Another student, Patricia, was more direct in her assessment of high school counseling, saying, “It wasn’t until the last year that we had a very good guidance counselor,” and even then her access to the counselor was limited. She speculated that a “better
guidance counselor” would have helped her prepare for college. Another student, Bea, said she did not use the guidance office as a resource because, as she put it, “You didn’t feel comfortable in going in and getting information there.”

In another example that suggests the complexity of guidance as a signal about students’ preparation for college, Marie explained that she had access to guidance personnel in her high school and that she did not feel intimidated, but Marie felt like she was “getting nowhere.” Marie observed that the guidance office was disorganized and that the guidance personnel did not make sure things were done properly, which she equated with incompetence. She spoke about a frustrating experience in which her high school transcript was lost or was not sent to a college, which colored her perception of the guidance staff. She felt she could not rely on them, and she lost faith in their support. She offered an especially poignant observation when she said that she felt prepared to graduate from high school but unprepared to enter college, and to her, that was a discouraging signal. She said, “I guess they just tell you what you need to graduate [from high school], and then they really didn’t prepare students to come to college.” She said that she did not begin to think about the relationship between her high school coursework and college requirements until her senior year, when she decided to major in business. However, at that point, it was too late to address the stringent mathematics requirements needed for her chosen college major.

Like Maria, another student, Patricia, who was mentioned earlier in this section, pointed out that the timing of guidance was important. When I asked her if she had received advisement from the guidance office about mathematics and college preparation, she replied,

Well, it wasn’t until last year that we had a very good guidance counselor. If you were lucky enough to get her when nobody else was there, it was surprising. You always had to have a meeting with her or you wouldn’t be able to get her. I was there like once every week tryin’ to get some information that I needed, but she was pretty busy, especially
since she was one of the ones that actually would try to help people. Cause our guidance counselor, yeah, she was crappy.

Patricia’s disparaging comment about guidance was prompted by my asking her if she had received any information about preparing for college-level mathematics. She quipped that, overall, she had not had a good experience with guidance.

Similarly, Bea said she had struggled in the last month of her senior year, referring to feeling intimidated by the thought of attending college (a theme she repeated multiple times during my interview with her). It is interesting to note that Cox (2009) devoted an entire chapter to the fear factor of college and identified math and composition as evoking the most anxiety. Bea felt that the high school guidance counselor focused more on students who already knew what they wanted to do, particularly those who wanted to attend a 4-year college. Describing her counselor, Bea said, “She was focusing more on the people [who] already knew what they were doing, and like, getting scholarships and all that straightened out, so I didn’t go to her.”

Another student, Shawn, echoed this same sentiment about students needing to know what they wanted to do, particularly knowing they wanted to attend a 4-year college, to get help from high school counselors, saying,

My high school counselor . . . she was more into the people that were going to 4-year colleges, like straight out of high school. She didn’t really help us that were coming to community college. I guess she figured we could figure it out on our own. Cause it’s not a big school or nothin’, so she didn’t really work too much with us that didn’t go to big colleges.

The signal received by Bea and Shawn was that preparing for college was not as important for students attending the community college as for students attending 4-year colleges and universities. These two students sensed the preferential treatment being given to some students in their high school, and they also understood that they were not on the preferred list. They both felt that students preparing to attend community colleges were not as important to the
guidance office because they did not receive a signal from guidance personnel that suggested they needed to prepare for college-level mathematics or for college in general.

The guidance and counseling process can be crucial to the success of students transitioning to college, and is especially important to students who are average academically, who are first generation, and who have not had the benefit of college literacy at home. The aforementioned examples portray students who felt uncomfortable with guidance personnel or who did not use the guidance office to prepare for their college transition. The students I interviewed needed in-depth guidance about college to help them understand what it takes to transition to any college. If students had been counseled by guidance personnel about the transition to college, including being counseled about preparing for college-level mathematics, they would have received a clear signal that could be very influential in their preparation for college.

In fairness to the guidance counselors in public high schools, their roles have changed through the years. There is evidence that in day-to-day practice, the efforts of counselors are largely dedicated to the tasks of scheduling, testing, and discipline (McDonough, 2005). Across the United States, the student-to-counselor ratio is reported to be 284:1, but in schools with 20% or more minorities and in large schools, the ratios are even higher, at 300:1 (Wirt et al., 2004). There seems to be little time left to dedicate to counseling for college preparation, especially for first-generation students who need more information and a deeper level of counseling. Several studies suggest that improved counseling would influence college preparation for low-income, rural, and urban students as well as students of color (Gandara & Bial, 1999; King, 1996; Plank & Jordan, 2001; Rosenbaum, Miller, & Krei, 1996; Venezia et al., 2003).
Mathematics Teacher Impatience

The impatience and anger of mathematics teachers were interpreted by students as a signal that they were incapable of learning mathematics. For example, Patricia was a Latina student in a predominantly White high school who took responsibility for her grasp of mathematics but who felt that one mathematics teacher’s attitude was a turning point in her learning the subject. Patricia recognized what was effective instruction because she had experienced a teacher in a junior high Prealgebra course who had modeled the attributes of a good teacher. Patricia said of her mathematics teacher, “I liked her because she actually explained the work to us.” Patricia believed she had a gift for mathematics, but she connected her performance in and understanding of mathematics to her relationship with the teacher. She explained how her relationship with another mathematics teacher affected her performance:

And I went to, I think it was Geometry, and it was hard because I didn’t like the teacher. And she was confusing, always screaming at us ’cause of something, ’cause we couldn’t understand it. She should have taught college! She needed to slow down (laughs).

Patricia mentioned the teacher’s anger because the students did not understand a concept and their resulting bewilderment. The anger and impatience of the teacher signaled to the students that they were somehow deficient because they did not understand. Not only did this approach to teaching make the students feel inadequate, but it also left them with a negative attitude toward mathematics overall.

In a similar vignette, Michelle related how she was counseled to prepare for the next mathematics class, with no discussion about how to plan ahead or the importance of preparing for college-level mathematics. She was advised to focus on the current year, which seemed contrary to the notion that high school students should begin planning for college from the beginning of high school during their freshman year, or before. Michelle also had a negative
experience with a mathematics teacher who influenced her attitude about mathematics. She reported,

Our teacher, I had, there was one of the teachers that kind of expected everyone to know. It was like, “I know how to do this, why don’t you?” It wasn’t much teaching, but you should know how to do this. Kind of like if I didn’t know I felt like that I should and it was kind of just expected for everyone to know. And he would get angry if people didn’t know what he was talking about. And then I took him for like 2 years, and after I got out of his class and went to the other teacher I did a lot better in that class.

Both Michelle and Patricia had vivid recollections of a point in time when a mathematics teacher had negatively affected their mathematics education. For them, it was not just the anger, but also the air of superiority reflected in Michelle’s statement that her teacher had “just expected for everyone to know.” No one learns well under duress, and when a teacher makes students feel inadequate, it seems that students begin to believe they are incapable of learning the subject. An angry mathematics teacher sent a signal to some students that influenced their understanding and preparation for mathematics.

Teacher misbehaviors have been identified as behaviors that interfere with instruction and learning (Kearney, Plax, Hays, & Ivey, 1991). Specifically, one of the identified behaviors studied by Kearney et al. was offensiveness; this concept was defined as teachers sending insulting messages. I believe some of the students’ experiences with mathematics instructors typified offensiveness, and students perceived the teachers’ offensiveness as an indicator that they were not worthy of the mathematics teachers’ time to teach them mathematics. As a consequence, the students believed they were not capable of learning the mathematics that was needed to enter college-level mathematics.

Impatience seems an inadequate word to describe the effect of an angry mathematics teacher on a high school student who does not understand a concept. Two students interviewed in the study experienced anger from a teacher in a mathematics classroom when they were
struggling, and they consequently believed that their learning was affected adversely. The signal sent by the mathematics teacher to students was one of ineptitude, and as a result, the students felt that they were incapable of learning mathematics. The Mathematical Sciences Education Board (1989) described the outcome of a learning environment that is not conducive to learning mathematics as follows:

Unfortunately, as children become socialized by school and society, they begin to view mathematics as a rigid system of externally dictated rules governed by standards of accuracy, speed, and memory. Their view of mathematics shifts gradually from enthusiasm to apprehension, from confidence to fear. Eventually, most students leave mathematics under duress, convinced that only geniuses can learn it. (p. 43)

When students experience the anger of a teacher because they cannot learn the mathematical concepts with the pedagogical method being used, they become apprehensive about mathematics and eventually fear being embarrassed because they do not understand. In this theme of mathematics teachers’ impatience, the poorest type of mathematics instruction was demonstrated when students lost their confidence and became fearful of their inability to learn mathematics.

**Mathematics Instruction Engagement**

Although not all mathematics teachers showed anger in the classroom, some simply did not engage the students in learning what they considered to be effective. Seven of the 10 students talked about a mathematics instructor who had influenced their understanding of mathematics in a negative way. Students interpreted the teachers’ inability to help them learn mathematics as a signal of indifference and lack of commitment to their learning. Many of the students reported being bored and feeling annoyed with mathematics. One student said that out of frustration, she taught herself with the aid of the book and homework. I came to understand, based on my interviews, that the teachers’ appreciation for the subject of mathematics may take priority over
their interest in helping others learn mathematics. Teachers’ presentations of concepts, their reactions and responses to students’ questions, and their grading influence students’ learning of mathematics and the students’ overall attitude toward the subject. The relationship between teachers and their students, including their delivery of instruction, is paramount to students’ learning. The students in my study suggested that some mathematics teachers approached mathematics instruction with an attitude of superiority, expecting students to be at a higher mastery level of mathematics than they were and to comprehend concepts quickly. When the students did not, they felt inadequate and incompetent.

Below, I present excerpts from student interviews that support my claim that high school teachers who are perceived by students as indifferent toward their learning of mathematics send a signal to students about their lack of preparation for college-level mathematics. Losing ground in a high school mathematics class diminishes a student’s chances of being ready for college-level mathematics.

In the first example, Rena talked about losing her stride in Algebra II because she felt the teacher could not teach. Rena attributed her struggles in Algebra II to a misalignment between the intellect of the teacher and the learning needs of the students, saying, “’Cause the teacher was really smart, like way too smart to teach us. She wasn’t a bad teacher, I just couldn’t learn sittin’ in her classroom ’cause she talked over my head.” In contrast, in her senior year, Rena took Algebra III and did well because “the teacher was really, like, down to earth.” Rena described the Algebra III class as “being a lot easier” because of the teacher.

Confirming the difference between Rena’s experience with what she considered to be good (“down to earth”) instruction and bad instruction, Shawn gave an example of the power of good instruction in one of her high school mathematics courses:
I had a very, very good teacher for the first semester. He was an awesome teacher. Like if you didn’t get it, he would take the time to explain and help you personally where you were struggling at. He would look at your grades and what part you were having problems with and explain it to you and stuff.

Shawn admitted that her experiences in high school mathematics courses were not all positive though. She described her high school geometry as “more like what college is now,” and as a result, she felt that she “did not learn anything from geometry.” Because there was no feedback and she got perfect scores, she believed that her homework was not graded. She observed, “If you did it, he gave you a 100.” There was no opportunity to learn from homework because it was never graded. The signal that Shawn received was disinterest on the part of the instructor, which led her to view mathematics negatively. Later in the interview, she reiterated that she had “no idea how to do geometry.”

Shawn linked her success in mathematics to the ability of the teacher to teach mathematics. She felt she was learning with one particular teacher, but when this teacher left halfway through the school year, her learning stopped, and it is no wonder. She reported that the rest of the year involved having the class watch movies or having a substitute, whom she described as “a terrible teacher.” She said,

We had a terrible teacher take his place and he was highly recommended. All the teachers liked him. But he came in the last part of my sophomore year and was trying to look at the classes and stuff, and he would stay in there. I just really did not like him. He wasn’t a very good teacher, so I didn’t take any of his classes.

As a community college student, Shawn experienced frustration again, describing her college Intermediate Algebra teacher as very boring. She admitted that to adjust, she was teaching herself with study guides, saying,

If the teacher does not . . . if I don’t like the teacher, I’m not going to do good in it because it just doesn’t help me at all. Like my Intermediate Algebra teacher now. I sleep through all of his classes every day, I sleep. He is so dry, so boring, it just, he does not help me at all (laughs). When I go home he gives us a study guide, I work on the study
guide, I look in the book, I look at . . . I got a student manual for the book that has the answers of all the odd questions and how you do them and that’s pretty much how I learn for his class. I teach myself because I sleep through the entire class. I don’t necessarily care for the way he teaches.

Similar to Rena and Shawn, Michelle had a negative experience with mathematics her freshman year. She reflected on her high school mathematics experience, saying,

It was right when I started in high school. My freshman year I was in his class. And then it was just like, wow. ’Cause like everyone would talk about him . . . He was a good person, but it was like teaching . . . He just has a different way at going at things. It just wasn’t what we were used to. It was kind of like a professor in college.

Michelle’s characterization of her teacher as being “like a professor in college” echoed the sentiments of other students I interviewed.

The signal for these students from the mathematics teachers was one of superiority or, even worse, a total lack of interest. They recognized good and effective teaching when they experienced it, and they also recognized bad and indifferent teaching when they experienced it. Although anger was not present in these examples of mathematics teaching, for one student, the fact that her mathematics teacher taught “like a professor in college” created duress and stifled the learning environment for students. They felt that the mathematics instructor was talking over their heads and was incapable of presenting lessons in a way that was conducive to their learning. Ineffective teaching, whether involving anger or indifference, is a signal to the student that influences their understanding of and preparation for college-level mathematics.

The study by Kearney et al. (1991) mentioned earlier in this dissertation suggested that mathematics teachers’ incompetence represents another form of teacher misbehavior that can be detrimental to students’ learning. Incompetence is manifest in boring lectures and a lack of knowledge of course content. Consequently, teachers leave students with the perception that they do not know what they are doing. According to Toale (2001), student learning is jeopardized
when any misbehavior is exhibited by a teacher. Whereas anger was not displayed in all high school mathematics classrooms, some of the high school mathematics instruction was not delivered in a way that would engage the student. One teacher was described by a student as “way too smart to teach us,” and in another example, a student explained that she struggled to learn mathematics “cause she talked over my head.” These examples of student experiences lent credence to the sentiment expressed in the Mathematical Sciences Education Board (1989) report that students believe mathematics is a subject that “only geniuses can learn” (p. 43).

**Lack of K-12 Resources in Relation to Mathematics Instruction**

The lack of rural, K-12 resources contributed to faculty and administrative turnover and sent signals to students that their education lacked value. This theme was associated with the rural area that the community college serves and the poverty level of its residents. Although the lack of K-12 resources seems to be a level removed from mathematics instruction, it had an influence on how students experienced mathematics instruction. Poverty and the remote, rural location of the schools were associated with resources lacking for education, which seemed to limit opportunities for students in mathematics, as well as other areas. This deficit was confirmed by administrators in the high schools and faculty in the high schools and community colleges. Students were aware that administrative and faculty turnover was a problem for their high schools in general and their mathematics classes specifically. The following excerpts from student interviews show how the lack of K-12 resources signaled to students disregard for their preparation for college-level mathematics.

In one of the high schools attended by Dawn and Marie, not only had there been turnover among the mathematics faculty, but the students had also had three principals, two
superintendents, and two guidance counselors during the 4 years they were in high school. Both students talked about the high turnover of personnel in their high school. Their education was disrupted with new administrators, who influenced how classroom teaching would be delivered and how the larger institutional environment would be represented to students. Turnover among guidance counselors and teachers is likely to have a more noticeable effect on students because they work closely with students, and they establish relationships with students that thrive and grow in stable circumstances.

Dawn talked about her experience with mathematics instruction and its inconsistency in high school. She observed how her own performance in a mathematics course was influenced by teacher turnover:

My one teacher, he mainly talked about his personal life. He’d talk about what he did on the weekend. He still lived with his momma. Yeah, I knew a little bit too much personal stuff about him. It wasn’t cool. And then he left, and we got a better teacher and she was pregnant and she went on maternity leave. So another teacher’s daughter stepped in, and I got an A in her class. And right before the school year ended, like 2 weeks before, she came back and my grade dipped down to a C. I would have had an A, but it dropped down to a C because she was there.

Dawn was frustrated by signals in the form of grades that were inconsistent during the teacher turnover. She experienced a chaotic year in a mathematics class that was crucial to her transition to college. The inconsistency of instruction in mathematics was compounded by the turnover of guidance counselors. With each new counselor, there was a learning curve and a loss of students’ academic history. The high school that Dawn and Marie attended had three different guidance counselors during their 4 years in high school, which disrupted the guidance available for their transition to college.

The lack of K-12 resources theme identified by students was supported by comments made by faculty at the community college. Mike, a developmental mathematics instructor, said
that the community college mathematics faculty had accepted that the mathematics skill level of entering freshmen would be in the Intermediate Algebra range. He noted,

Oh, I think the school [community college] realizes our area, and they expect most students to start in either Introduction or Intermediate Algebra. We have a very good grasp on where our students are in mathematics in this area. So as far as the school is concerned, we have a lot more sections of 041 (Introduction to Algebra) and 114 (Intermediate Algebra) than we do of any of the other mathematics. And to give you an idea, we only have two sections of College Algebra, and we probably have 10 or more of 114 (Intermediate Algebra).

Mike prefaced his statement with “the school realizes our area,” which seemed to be a veiled reference to the poverty and scarcity of resources for education in the region where this study was conducted. What was most disturbing about Mike’s comments was the expectation that students would enter the community college with remedial mathematics skills. If true, that perception by the college personnel may contribute to students believing that their high school mathematics preparation was not rigorous enough to prepare them for college-level mathematics and furthermore, that this deficit was considered acceptable to the high school and community college.

In the second vignette, Victor, who also teaches mathematics at the community college, identified issues that seemed to be related to the poverty of the area and lack of resources, such as the size of the high schools in the district and their inability to offer higher levels of mathematics. He noted,

I also think that with some of the schools here in the district that are real small, I know when I went to high school, my class was 376, so it was different than around here. We had enough students that we could have classes at a lot of different levels, but here they don’t have that opportunity. There’s certain levels, but there is only one class for the students.

Victor believed that the community college accepts that students will have lower entry-level mathematics skills because of the lack of resources in small high schools.
In the third vignette, Catherine noted that a student in her Intermediate Algebra class was knowledgeable in mathematics, but had “holes.” She reported confidently, “I know that Nicole has holes. She’s a very good student, but when we work on some things, it’s like she’s never seen them before. Somehow she has holes. I don’t know why. I don’t know if she’s forgotten or they weren’t taught.” As a reminder, Nicole is the student who took Calculus her senior year and struggled with the community college placement exam. She ended up taking Intermediate Algebra her first semester at the community college. It is possible that the “holes” in Nicole’s mathematics education may be due to the inability of her rural high school to provide qualified higher level mathematics instruction, reflecting the rural deficit reported in the literature.

The lack of K-12 resources sent a powerful signal to students about their lack of preparation for college mathematics. Administrator turnover and mathematics instruction were influenced by a lack of resources in the rural high schools. Losing mathematics faculty and counselors midyear was disruptive to the educational process, and students were quick to point out that the loss of personnel sent a negative signal to them about their preparation for college. At the other end of the spectrum, the community college mathematics faculty seemed to have accepted that many students from the surrounding rural area would arrive unprepared and need remediation in mathematics. The community college faculty accepted the lack of preparation of students, and they structured their remedial mathematics classes to accommodate it.

“Someone to Push You”

The phrase “someone to push you” came up in discussions about guidance, but it could apply to the high school overall, and I believe it has applicability to mathematics. Students seemed to be looking for the bar to be set high in all their classes and in expectations about going to college. They wanted their teachers to have some confidence in their capability of going to
college, but this confidence was not apparent. It is as if the students were looking for discipline and accountability from their teachers, and they did not get it. At least 3 of the 10 students spoke directly to the lack of a teacher pushing them as a signal that they were not worthy of college. On the other hand, all the students pointed to someone who was very influential in what success they did have in high school and their subsequent transfer to college.

With respect to the theme of “someone to push you,” two of the students, Dawn and Marie, mentioned wanting someone at the high school to encourage and support them. They used the words “push you” in their comments and alluded to the importance of someone having expectations for them and holding them accountable. When Marie answered the question about who sent the strongest signals to her about college attendance, she responded,

> [My] family, my friends, and our superintendent. I'll tell everybody that, you know, it’s who will push you instead of knocking you back, “You shouldn’t go there.” Somebody in the school because I never had that before that somebody in the school that would push you and encourage you instead of look down on you. I feel that those are my strongest signals.

Without being prompted, Dawn indicated that having someone at the high school to “push you” would have been beneficial. She chose the same words that Marie used, and this idea seems important to understanding her perceptions about her preparation for college. She described her high school learning experience as follows: “They never really checked up on you. You had to do it yourself.” I got the impression that “someone to push you” meant that the students wanted school personnel to have high expectations of them to set goals not only to prepare for college, but also to attend college.

In support of this theme of “someone to push you,” students noted that teachers in the English discipline were doing just that. According to several students I interviewed, the high school English classes had the most activities and discussions of any high school classes about
college preparation. The students reported essay assignments on college and careers to assist them in understanding how to prepare for college. These assignments were occurring in English and Advanced Placement classes, where discussions about college expectations were prevalent and inclusive of all students. Dawn mentioned frequent discussions in her English class as sending her the strongest signal about college preparation. Describing her English teacher’s approach to college preparation, Dawn observed,

She talked about it freely. She talked to us as a class. She’d just say, she’d just talk about the different colleges she went to. She’d like, through her experiences, and she said well, “If you want to go just go and . . . make the best of it, and get you a higher education.”

Shawn’s English teacher told students what skills would be expected of them in college. Shawn praised her English teacher’s efforts to prepare students for college, and she noted, “If more teachers had done that, it would be easier, you know.” Shawn went on to describe succinctly what should be happening in all high school classes, especially mathematics.

For Patricia, the English teacher sent a positive signal just by showing interest in the students’ going to college. The teacher pushed scholarships and wanted to know where the students were going to attend college. Apparently, this teacher was encouraging to many students because I heard her name from another interviewee. Possibly representing the perspective of other first-generation students who needed special attention when it came to college preparation, Patricia referred to the same teacher named by other students, saying, “She’s like our mother at school. She helps everybody out. She tries to keep us all in line.” Like other students, her statement described encouragement combined with an expectation that students should be accountable for their decisions and behaviors.

In another example of “someone to push you,” three students were attending college as student athletes, and they all identified coaches as sending them signals regarding college
preparation. One of the athletes, Alan, began planning for college his sophomore year of high school, when his basketball coach gave him information to prepare for college. This coach sent signals to Alan early in his high school career suggesting that he should be planning his courses in high school to prepare him for the transition to college.

The second athlete, Lewis, shared that basketball was his motivation to attend college. His high school coach advocated for his athletes and mentored them through the college application process. This student was preparing for college because he wanted to play the sport, but his coaches were promoting scholarships and education in addition to the sport. The community college coach also sent Lewis a signal of acceptance: “But Coach showed a lot more interest. He actually, he made me feel like I was welcome here.”

Rena, the third athlete, also identified her coaches as sending signals about college preparation. She talked about the relationship she had with them, and she observed that they had kept her “on the right track.” Rena also mentioned her softball coach as instrumental in helping her get information. She said that her coach was younger and gave her a sense of reassurance about talking about college, saying, “I felt more comfortable talkin’ to her about it. She actually helped me fill out all my scholarships and references and stuff.”

To summarize the “push you” theme, the signal sent by English faculty about the transition to college was an example of how a high school classroom initiative could be used to help students prepare for college. Students were eager and appreciative of the information they received in English, and if that could be repeated and reinforced in mathematics, it might help students avoid mathematics remediation in college. Coaches offered similar advantages to students who wanted to attend college to play sports. Athletes were counseled by coaches, not because of college preparation per se, but because their coaches reinforced the importance of an
academic record that would qualify them for a scholarship to play sports in college. The students may not have been performing academically to be prepared for college-level work, but because they wanted to play sports, they were being held accountable to become academically eligible for their sport. These examples show how signals to students about the importance of college can have positive results on their preparation.

**Summary**

The students in this study faced many challenges when it came to preparing for college-level mathematics and college in general because they were typically first generation and their academic background was lacking. They were not challenged, however, when identifying signals that were meaningful to them concerning their preparation for college-level mathematics. It was sometimes difficult to separate signals about college preparation in general from signals about college preparation for mathematics in particular because they are so closely related. Of the six themes identified in this study about signals concerning students’ preparation for college-level mathematics, the signal of “someone to push you” stood out as the most direct and positive when it was associated with an English teacher who spoke to students about the importance of preparing for college. Based on my interviews with students who were not prepared for college-level mathematics, most signals were indirect and only loosely associated with the students’ placement in Intermediate Algebra in the community college.

The implications of these themes for improving the mathematics skills of aspiring community college students are intriguing. Identifying signals that influence students’ preparation for college mathematics is the first step to addressing the miscommunication that occurs between schools and students. When the students received vague or confusing signals
about whether they were prepared for college-level mathematics and college in general, they were frustrated and discouraged about the possibility of attending college and being successful college-level students. Had some clear signals about what it would take for the students to prepare for college been sent to them, they might have been better prepared. None of the students identified current practices aimed at college preparation (e.g., college days) as influential. Rethinking the types of signals sent based on these identified themes may help students become more engaged and better supported as learners in high school mathematics classrooms.

Although this was a small study, the themes identified through the lens of signaling theory provide a different perspective on how students prepare for college-level math. The information gained through this study, at the very least, warrants exploration of these themes and the application of signaling theory in future studies about mathematics preparation for community college students.
Chapter 6

Conclusions, Implications, and Recommendations

This study of the role of signaling on students’ transition from high school to the community college came about because of my interest in the struggle that students experience when they are required to take remedial mathematics courses at the community college level. I chose the case study design and collected data by conducting face-to-face interviews with 10 community college students who were enrolled in Intermediate Algebra at the time of my interview. The study allowed students to speak about their experiences with mathematics, including their difficulties with remedial mathematics and the consequences of their high school decisions and experiences to enroll in mathematics courses. I triangulated the data received from the students with data obtained by interviewing faculty and administrators from their high schools and the community college. In addition, I interviewed a guidance counselor from a high school attended by one of the interviewees and used these data to corroborate the student interviews.

I personally conducted all the interviews and then taped and transcribed each one. Because of the time-intensive nature of transcribing, I believe I gained greater familiarity with the stories of each of the interviewees than if I had paid a transcriptionist. After completing the transcription process and later, when reviewing the transcripts repeatedly, I could picture and hear the students’ voices as they answered the questions, and that was very helpful in analyzing the data. I feel confident that I became fully immersed in the data, and this immersion experience helped me create a nuanced story of how the signals students received in high school influenced their experiences with remedial mathematics in the community college.
Conclusions and Implications

The concept of signaling is very complex because of all the components of human communication. Despite the complexity of the process, once the concept of signaling was explained to students in a way they could understand, they were able to talk about how signaling applied to their experiences with mathematics. As my interviews with the students progressed, I realized that the selection of the signal was influenced by the sender, as Ruben (1992) and Schram (1965) suggested, as well as by the receiver. In the case of this study of mathematics, the sender was typically an educational professional who wholeheartedly believed that the signal was understandable by a younger, inexperienced receiver. Students, however, received and processed the signal with a very limited worldview, especially when the students were rural and first-generation college goers who had little life experience beyond their own families and small communities. Although parents and peers had some influence on students’ preparation for college, the students lacked knowledge because of their limited experience with higher education. These primarily first-generation students in the rural community college had to rely on their high schools and the local community college to provide them with information, although oftentimes the information they received was inadequate to give them sufficient support to know what to do.

Research Question 1

The first research question, addressed in Chapter 4, was, “What experiences do students identify as relevant to their transition to college and preparation for college-level math?” The information included in each profile addressed the students’ personal and academic experiences to describe their backgrounds. Each profile included (a) my first impression of the student; (b)
his or her performance in high school math; (c) his or her family background; (d) his or her aspirations to attend college; and (e) follow-up on his or her persistence in the Intermediate Algebra class.

**Conclusions for Research Question 1**

Students’ experiences related to their transition to the community college were partially revealed in their high school and community college transcripts. The class rank in high school ranged from 74 to 22%, with most students falling somewhere in the middle. Two of the 10 students had no math their senior year, and one student had no math her junior year but did take math her senior year. The highest levels of math completed varied, ranging from Geometry to Calculus and Trigonometry. Regardless of the level completed, all the students were required to take remedial mathematics at the community college, and all the students were enrolled in Intermediate Algebra at the time of my interviews. Oddly enough, those students who had taken three or four math classes at a higher level in high school fared no better in math placement at the community college than did students who had taken fewer math courses and had poorer performance. The students’ high school transcripts told a story of mediocre academic performance and sporadic or illogical mathematics course-taking patterns, as evidenced by the perceived (mis)placement of students in Intermediate Algebra or remedial mathematics in the community college. Seven of the 10 students said they did not begin to plan or even think about college until the 10th or 11th grade. By that point, some of the students realized that decisions they had made early in their high school careers could not be reversed and would result in their lacking fundamental skills and knowledge to enroll in college ready to learn. Signals from the guidance office were sporadic or nonexistent for nearly all the students because most students avoided communicating with their high school guidance personnel. Speculating, I sensed a
relationship between the students’ lack of planning and their avoidance of (or the absence of) guidance counseling. Based on the transcript information and their latent planning for college (by their own admission), the students seemed to be lacking knowledge of how to prepare for college and make a smooth transition. In addition, the students were suffering the consequences of a misalignment of the math curricula between high schools and community colleges.

**Implications for Research Question 1**

Seven of the 10 students were first-generation college goers. Despite having no parent or sibling who had attended college before them, the students’ families were supportive of their children attending college. For these first-generation students, the support they received from their parents was sometimes passive, yielding limited tangible benefits. For example, a first-generation Latina student told me that her parents were very encouraging, but they did not understand the college process, leaving her feeling disadvantaged. She felt overwhelmed because the decisions about how to enroll in college and navigate her college education were left to her alone. First-generation, academically and economically disadvantaged students value parental support, but that support often falls short of the students’ needs (Venezia, Kirst, & Antonio, 2003). This phenomenon was clearly evident among the students involved in my study.

Discussing family finances was a delicate matter for many of the students. Three of the 10 students worked 30 to 40 hours a week in high school and had continued to do so while attending college so that they could pay for their college education. Two students mentioned that their parents had recently become unemployed, and all the students were receiving some type of financial aid. Based on the financial concerns of the family, as evidenced by the students’ work life, the parents’ unemployment, and the students’ financial aid support, college cost was an important factor in the attendance of these first-generation students. I do not believe college
enrollment would have been possible for these students without this aid, which amplifies the importance of students advancing into college-level course work without needing to take remedial courses so that all their credits would count toward their sought-after credentials.

**Recommendations for Question 1**

The data gathered for the first question provided a meaningful context for understanding the signals that students reported regarding their preparation for college-level mathematics and college in general. These data suggest that guidance counseling and curriculum alignment are important to helping first-generation, academically and economically disadvantaged students be successful. The interview data revealed that better guidance and counseling are needed to prevent sporadic and inadequate course-taking in high school mathematics. In addition, the higher level math classes that some of the students completed in high school did not prepare them for college-level math, as evidenced by their placement in Intermediate Algebra. Despite some students receiving a satisfactory grade in a high school math course at the level of Trigonometry and Precalculus, they still tested into a remedial mathematics course at the community college.

Venezia, Bracco, and Nodine (2010) recommended that messages or signals about preparedness for community colleges should be expanded to reach 9th- and 10th-grade students so that they can obtain pertinent information early in high school, when they have the opportunity to change their schedules and the intensity of study. Coordinated efforts on the part of both high schools and community colleges to send intentional signals of college preparedness in all disciplines for the 4 years students are in high school might increase their opportunity for a successful transition into community college.

Parental support and knowledge of college preparation and financial aid are factors that could enhance the success of first-generation, academically and economically disadvantaged
students (Venezia et al., 2003). All the students indicated that their parents wanted them to attend college and were supportive, but the support was limited. The parents did not have the knowledge to assist their children with course selection in high school, nor did they understand how to help their children through the maze of community college application and registration procedures. Furthermore, students said their parents were daunted by the financial aid process and had little knowledge of aid money available to help their children.

At the heart of the conclusions and implications for Question 1 is the first-generation status of the students. The label itself, *first generation*, signals the challenges that being first in anything represents. In many cases, by the time students realized what they needed to be successful, they were already behind in their preparation for college. Guidance is important to students’ success, so if first-generation students and their parents are equipped with knowledge about how to prepare for a community college education early on, it might reduce the number of students who test into remedial math.

**Research Question 2**

The second research question was, “What phenomena do students interpret as signals about their readiness for college-level mathematics, and what is their understanding of how these signals have influenced their transition to the community college?” In answering this question, the following six themes about signals emerged:

1. Placement and performance in mathematics;
2. High school guidance;
3. Mathematics teachers’ impatience;
4. Engagement in mathematics instruction;
5. Lack of K-12 resources in relation to mathematics instruction; and
6. “Someone to push you” in high school.

These themes emerged in the qualitative data, and they appeared to provide a useful beginning to understand how this small group of rural, first-generation, economically disadvantaged students understood signals about their readiness for mathematics in the community college.

**Conclusions for Research Question 2**

1. The students received as many negative signals as positive signals, or more.

   In reviewing the six themes represented in the data, only one theme appeared to be perceived by two of the students as positive, and that one was associated with classroom presentations by an English teacher about college preparation. The students described the English teacher as very intentional in her signal to students about what they could expect when they encountered English in college. She described the skills that would be expected and talked to her students about what college life would be like. The other five signals were negative in nature and emanated from educational professionals in the role of authority figures who were influential to the students. Guidance counselors and math teachers stood out among these professionals as part of the students’ daily lives. Consequently, these professionals could improve or deter a student’s success in math and his or her overall high school experience. Although mostly not playing a significant role, guidance counselors could link math placement and performance to students’ preparation for taking the placement test and for taking math more seriously in high school. The last negative theme, of rural K-12 resources, overshadowed the other five because funding is tied to the delivery of education in K-12 and has an effect on teaching, guidance counseling, and the quality of programming.
2. Signaling theory appears to be meaningful to education because it helps identify what signals students are receiving and how those signals influence their preparation for college-level math.

Spence (1973) introduced signaling theory in his seminal work in economics, but it was tied to education as the result, not with signaling as a contributor to how the education was achieved. Thus, in that study it seemed fitting to explore the messages students received about college leading up to the degree and eventual job. When I explained how signaling was being used in the present study, students understood its application and shared the signals that had the most influence on them while preparing for college-level math in high school. In the supporting interviews with faculty and administrators, they too understood signaling theory and confirmed some of the themes that emerged with students, such as math teacher instruction.

The premise underlying the use of signaling theory is that high school students’ lack of preparation for college-level math might be due to something other than a deficit on their part (e.g., a lack of motivation). Rather, signaling puts some of the onus back on the educational culture and provides an opportunity to understand what signals the students process about math and how they interpret those signals. The value of this concept lies in the potential for educators to create new signals to send to students, or better yet, to eliminate or restructure negative signals. The negative signals identified by students in this small study, such as math teacher anger or indifference, could be the catalyst for conducting a study of a larger proportion of students that would focus on only that topic. Understanding the math teacher–student relationship better through signaling theory could lead to greater student success in math and ultimately a smoother transition to college.
3. Conducting this study in a rural area brought issues to light that might be related to the signals students receive about math preparation.

This study was intentionally conducted in a rural area to determine if there was any relationship between the signals sent and received about mathematics and college readiness. Because the study was conducted in one rural area without a comparison with other rural areas or other areas that represent a more metropolitan or urban context, I can only speak to the evidence I gathered pertaining to this study and the primary informants.

However, in a study by Anderson and Chang (2011) on mathematics course-taking in rural high schools, the authors found that rural students were less likely to enroll in Geometry their first year in high school when compared with their peers in other locations. When checking the high school transcripts of the students interviewed for the present study, only 2 out of 10, or 20%, had enrolled in Geometry their first year in high school. Anderson and Chang also found that fewer than 40% of rural high school students studied Advanced Mathematics or Calculus, as compared with urban fringe students, 50% or more of whom had enrolled. Of the students in the present study, only two, or 20%, took math beyond Algebra II. One possible reason for these phenomena could be a lack of signaling in high school about the importance of math preparation for college. It is no coincidence that the two students who began high school in Geometry were the same students who were able to reach a level of math beyond Algebra II.

4. First-generation students, and especially students of color, seem to struggle with how to advocate for themselves in situations pertaining to their education and preparation for college.

Rena was a first-generation Caucasian athlete who had been in college preparation classes in high school in another state, yet when she transferred to the community college, she
placed into a college preparation reading class and Intermediate Algebra. When I questioned her about her reaction to the placement, she seemed resigned to completing the recommended remedial courses without question. Her attitude was one of acceptance without question.

Two of the students interviewed were Latinas, and although one had a much stronger personality, it seemed that both suffered from poor advisement. Bea repeatedly encountered issues with not being placed into the math classes she felt she was qualified to take. A review of her high school transcript indicated that she had performed well in lower level classes, as she had indicated, which, in the case of Prealgebra, was a 98% average. Patricia was an excellent student in math, took Trigonometry her junior year, and had no other math until she enrolled at the community college. Patricia did not communicate with guidance staff until her senior year, when, according to her, “we actually had a good counselor.” Bea was intimidated by guidance, but Patricia simply did not see guidance counselors as a resource.

**Implications for Research Question 2**

1. Being intentional about the signals that educators, including teachers, guidance counselors, and administrators at the high school and community college levels, send is important to all students, but especially to first-generation students.

Five of the six signals students identified emerged as negative. These signals appeared to have a great influence on the confidence of students in math and, in general, on their preparation for college. Yet the negative signals should not be classified as intentional by the sender. The math teachers were not aware that their anger and indifference led students to believe they were incapable of learning math. In addition, the guidance counselors were not aware that they sent signals of disinterest to the students I interviewed by focusing on the population that planned to
attend a 4-year university. Yet these are the signals students identified as being important and as having an influence on their preparation for math and college.

2. Applying signaling theory to education introduces a new lens through which to view the way high school students interpret signals.

The transition of signaling theory from economics to education seems to have merit, as first demonstrated by Kirst and Venezia (2004) and in this study on a much smaller scale. Education in the world of economics, according to Spence (1973), indicates the ability of an applicant to perform for a potential employer; it now appears that signaling theory can be applied to explain the signals that led to that education. This transition is not too far afield because it is still ultimately concerned with the end goal of job attainment.

Other theories that have been used to study education are social and cultural capital theories. Bourdieu’s (1987) definitions of social and cultural capital are based on attributes of individuals or groups, whereas signaling is concerned with the messages sent to those individuals or groups:

Social capital is defined as resources based on group membership, relationships, networks of influence and support. Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition. (p. 51)

Cultural capital is defined as forms of knowledge, skills, education, and advantages that a person has which give them a higher status in society. Parents provide their children with cultural capital by transmitting the attitudes and knowledge needed to succeed in the current educational system. (p. 47)

Based on the findings of this small study, giving consideration to the identity of the groups sending signals as well as the identity of the students receiving those signals might improve the signals sent and their interpretation. Social capital could be used to support the notion that groups of students who are economically disadvantaged lack the resources needed to navigate the
challenges of college preparation. It could also be applied to ethnic groups, such as the Latinas who participated in this study. Cultural capital, as defined above, could be used to describe the knowledge that economically disadvantaged students and their parents are lacking but which is needed to navigate the challenges of college preparation. However, using signaling theory to study the preparation of students for one aspect of college, such as math, goes a level deeper than is addressed by social or cultural capital theory. By exploring how a lack of social or cultural capital influences math preparation in the years leading up to the transition to a community college, these theories may help explain why students are not successful.

3. Signals regarding math preparation in a rural area are different because of money issues.

There was turnover in math faculty at two of the high schools in the study. For example, one student commented on how a math teacher had left the school in midsemester and the class had watched movies for the remaining weeks. I can only speculate about the causes of math teacher turnover, but it is possible that pay could have been a factor, given the lack of resources in the small, rural schools that were part of this study. In support of that speculation, research by Beeson and Strange (2003) rated states on their educational services in rural areas and classified conditions in Illinois as critical. Specifically, the state ranked third among the 50 states as the worst in getting financial resources to the classroom, and teacher salaries were second worst in the nation. These funding issues for education in rural areas affected the quality of math instruction and, as a result, sent signals to students that their math education was not important.

4. Signals of confidence and self-advocacy are important to first-generation students, especially students of color.

I sensed that all 10 of the students in the study were struggling with self-confidence where math was concerned and overall with college in general. However, I felt the two Latinas
were especially hampered by their culture because they were reluctant to question placement in math or advocate for themselves. Although the personalities of Patricia and Bea presented differently, with Patricia being the stronger, the outcome for them was similar in that they did not receive the guidance they needed to be successful in preparing for college-level math. On several occasions, Bea was placed in a lower level math class than she felt was appropriate for her skill level, but she did not challenge the placement. Patricia liked math and did well in her math classes, but she did not push to be considered for higher level math classes in high school. Neither student understood that she could advocate for herself and challenge her placement. This may have been due to their lack of college knowledge, but it could also be attributed to their culture. Their responses were in stark contrast to those of Nicole, who questioned the results of the test and requested to be retested, not once but three times, before she finally accepted her placement.

**Recommendations for Question 2**

1. What math teachers say and do matters, so it is important for them to be trained in a way that heightens their awareness of the signals they send to students in class.

   Students identified signals that math teachers sent that were negative to them. Even though those signals could be construed as unintentional, it suggests that math teachers should be more intentional in the signals they send to students struggling to learn math concepts. First-generation, academically and economically disadvantaged students seemed to be susceptible to the math teachers’ inability to engage them in learning, whether demonstrated by disinterest or anger. Educators should explore ways that math teachers can send more positive signals to students who are struggling to learn math concepts.

2. Educational researchers should utilize signaling theory to study more issues in education.
Because signaling theory seems to apply to education, more studies should be done to explore its use in educational contexts. Therefore, it is of major importance to consider the identity of students, where they live, their socioeconomic status, and their first-generation status to further explore the signals that are influencing those students’ preparation for college mathematics and college in general. Repeating the study by using a combination of signaling and other theories might help explain how signals are interpreted by students. Akerlof and Kranton (2010) have formulated a theory that introduces identity to economics. Using the theory of identity economics along with signaling theory might explain how and why students make the decisions they do about mathematics and college preparation. The theory of identity economics may help determine who the students are and how to structure signals that would take into consideration the culture of the students and the school. In the chapter “Identity and the Economics of Education” from the book Identity Economics, Akerlof and Kranton explain this theory:

We consider students who want to fit in with their peers, and schools that are social institutions. The identity ingredients give a new window on what makes schools effective; why school-reform programs work or fail; and why students go to school, which is what economists call the “demand for education.” (p. 61)

The continuum of education can be visualized through many lenses that students rely on to make decisions about college preparation. If we want to increase the retention and completion of rural, first-generation students in community colleges, we must understand who the students are, how they prepare, and why they do not prepare, which will help educators send the signals that are the most powerful for them.

3. Research ways that rural K-12 educators can send positive signals to math students residing in a rural area about their preparation for college-level math.
Rural schools have not been as prevalent in the national conversation about education as urban schools (Beeson & Strange, 2003; McArdle, 2008), and this is unfortunate. Rural institutions have unique concerns, such as poverty, scant access to services, transportation problems, and low teacher pay (McArdle). Approaching the problem of mathematics remediation through the lens of signaling brought new themes to light, such as the effect of low teacher pay on mathematics instruction. Although research in rural areas has increased, knowledge is still lacking on how the education of rural students is affected by their locale.

Because the possibility arose that funding in rural areas could send signals to students about the importance of mathematics and about the importance of their success, it is an area that should be researched further. The research of Anderson and Chang (2011) has identified areas where rural students are lacking in math when compared with their urban-dwelling counterparts, such as that rural students appear to take their last math class sooner than students in other high schools. Rural students also end their mathematics studies at a level below students in other high schools. Regarding how to improve signaling about math preparation in rural high schools, it would appear that the answer is tied to funding.

4. Conduct further research on effective strategies to help first-generation students acquire skills that would improve their ability to advocate for themselves, such as consequential thinking and assertiveness.

First-generation, academically and economically disadvantaged students have not learned how to advocate for themselves. They do not have examples in their families of how to navigate the sometimes confusing waters of higher education. In the example of the Latinas, they had additional cultural barriers that prevented them from challenging or questioning their math placement. The signals these students received were further complicated by their ethnicity.
Knowing how to ask questions and respectfully represent themselves is important to their preparation for college-level math and college.

Although the focus of this study was not on ethnicity, and despite African Americans and Hispanics being represented in the sample, the theory of identity economics could be a key in diagnosing the barriers to college transition for minorities because the ethnic culture could be taken into consideration. This is also an area recommended for further research in mathematics remediation in the transition from high school to community college. Akerlof and Kranton (2010) have explored the theory of economic identity as it relates to race and minority poverty for African Americans, and they believe this theory has potential for what they term *oppositional identity*. This theory holds promise for increasing minority transition and completion rates in community colleges because it is built on identity, discrimination, and minority poverty.

**Final Thoughts**

Throughout this study, and especially when identifying themes, I tried to determine the terminology that would appropriately describe the types of signals students received and the intention of the sender. In analyzing the data, the intention of the signal based on my perception did not always seem to be the way the signal was interpreted by the receiver, and I believe the difference lay in the identity of the receiver, namely, being first-generation, rural, and economically and academically disadvantaged.

Five of the six signals students identified in this study, in my opinion, did not seem intentional, yet they were very powerful. Determining whether these themes are indeed problematic for other community college students and then addressing them by changing the signal might help students be more prepared for college mathematics, and overall for college in general.
Even though the community college in this study was proactive in its visibility to high school students, it did not reach out to the students early in their high school careers. A clear signal of access was being sent through the community college’s recruitment and high school student scheduling processes, but no signal was given to students about the academic demands of college-level mathematics. A focused effort on the part of K-12 schools and the community college to educate students throughout high school about the requirements for transition to community college mathematics would send them a signal of the importance and urgency of learning college-preparatory mathematics in high school. It is very important that the signal be intentional on the part of the high school and the community college when first-generation, economically disadvantaged students and students who have historically had average academic performance are involved.
References


Appendix A

Interview Instruments

The Signaling Project—Student Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. When I use the word signal, I mean influential factors from high school, local community college, parents/family, and peers that guided the student or not as decisions were made about college. What was the determination between general information and a signal? Signals would have made an impression with the student. For example, if a student’s parents were concerned about college cost, the student was signaled that it might not be affordable to go to college. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and were enrolled in Intermediate Algebra. This research primarily targeted educational and personal factors that influenced the students’ decisions regarding their pursuit of higher education. How do signals from family, peers, high schools, and community colleges help or hinder the students as they begin their college career?

1. Tell me about your math experience in high school. How many years of math did you complete? What math courses did you take? Did you take math your senior year? How did you do (what grades)? Did you like the classes? When you were taking high school math, did you ever learn about college-level math requirements?
2. Were you aware that you would have to take a placement exam to enroll in a community college? If so, where did you get that information?

3. Did you take the placement test at this community college for math or are you in this course based on another entrance exam? If so, what exam? Tell me about taking the test. What did you think about the test? What did you think about your test results? Were the results what you expected? Were you surprised? How did you find out the results? What did you do when you found out about the results? Did you talk to anyone? Did you try to get out of taking the remedial course?

4. Describe your reaction when you were told you placed into a developmental math course? Were you told the developmental course was required before enrolling in a college-level math course?

5. Did you ever discuss the admission requirements to get into college (any institution) with any of the following people?

   _____parents   _____h. s. counselor   _____h. s. teacher   _____friends/other students
   _____brother or sister   _____another relative   _____family friend   _____college recruiter
   _____h. s. coach   _____other

   Describe the contact: Were there multiple discussions? Do you remember in what grade discussion of college admission requirements began?

6. Overall, how would you describe the amount of information you received about college? Were you open to the information, or did it seem to be irrelevant? Do you recall any discussions or advice about math preparation for college?

Family

7. Did your parents attend college? Do you have siblings that attended college? If so, have they been helpful? How so? What did they tell you about math?

8. Was there always the expectation from your parents that you would attend college? Were they active in helping you plan your schedule in high school?

9. How would you characterize your family’s economic status? Has it been a factor in your plans to attend college?
Peers

10. Was there an expectation among your friends that you would attend college? Are they in college now? Do you know if they were prepared for college-level math?

11. How influential have your friends been in your choice of schools and your college major?

12. In your peer group, what was the focus? Being a good student or having fun?

High School

13. In what grade did you become serious about attending college? When did you begin to make course selections based on college attendance? Who helped you make these decisions?

14. Did you participate in college days? Did you meet with an advisor at the college to learn about requirements? Were you focused on a particular program?

15. What was your relationship with the guidance office? Did you frequent the guidance office with questions? How do you feel about the services they provided? Looking back, what would have been more helpful or effective for you? How could they have helped you avoid being placed in this remedial math course?

16. Did you consult with teachers regarding college or what you wanted to major in?

17. When you made your course selections for the year, what were your decisions based on? Did you avoid math courses?

18. What were your math classes like in high school? Did you feel comfortable asking questions? Was the focus on the right answer or on the process to get the right answer? Did you do your homework and try hard or did you just do enough to get by?

19. Who was the most influential person in high school that prepared you for college? Why was their approach significant for you?

Colleges

The following questions are about your perception and awareness of this community college throughout high school. I want to know if there were activities or information that might
have influenced your enrollment here. For example, because of the dual-credit courses you took during high school, you were convinced that this community college would be a good place to complete an associate’s degree before transferring. Another example might be that you established a relationship with the financial aid representative the night they did a presentation at your high school and because of that contact, you completed a financial aid application and felt this community college would be a good school to attend. Those would be positive signals from the community college that assisted you in making your decision to attend here. In what grade did you make a conscious choice to attend college? Do you recall if there was a particular piece of information, event, or experience that triggered this decision?

20. Were you contacted by colleges or did you ever attend a college fair?

21. How did you and your friends view community colleges while in high school?

22. Was the community college in which you are now enrolled your first choice? Why did you select this college?

23. Did you visit this community college when you were in high school?

24. Was there open communication between your high school and the community college?

25. Were you aware of any recruitment efforts by this community college? Did they ever come to your high school? Did they offer dual-credit courses at your high school?

26. Did you take dual-credit, summer, night, or online courses through this community college? If so, how many credits did you have upon entry?

27. Did the community college provide your high school with information on financial aid? Were they helpful in the application process?

28. As you reflect back over your high school years, what was the signal from the community college that stands out most in your mind?
29. Can you think of any other signals from family, peers, your high school, or this community college that were influential in your decision to enroll here?

30. Will you be available for follow-up questions in the future?

Documents to Request:

- Information on transfer requirements and dual (or concurrent) enrollment programs;
- College course catalog;
- College policies regarding admission, remediation, placement, advising, financial aid, transfer, earning credit, and being granted credit for previous coursework;
- Statement of competencies or expectations of incoming students;
- Admission and placement test/procedures packets, and/or college publications for prospective students and/or counselors;
- Official college policies regarding admission, remediation, placement, advising, financial aid, transfer, earning credit, and being granted credit for previous coursework
The Signaling Project—Community College Administrators Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. When I use the word *signal*, I mean influential factors from high school, local community college, parents/family, and peers that guided the student or not as decisions were made about college. What was the determination between general information and a signal? Signals would have made an impression with the student. For example, if a student’s parents were concerned about college cost, the student might interpret that concern as a signal college might not be affordable. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and are enrolled in Intermediate Algebra. This research will primarily target educational and personal factors that influence the students’ decisions regarding their pursuit of higher education. How do signals from family, peers, high schools, and community colleges help or hinder the students as they begin their college career?

Date

Name of the administrator:

Title and responsibilities of the position:

Administrator’s educational background:

1. Do you currently teach or have you taught in the past?
2. What is your background in math? Were you always good at math?

3. What is your student intake process (admission, matriculation, outreach, counseling, transcript evaluation)? Who is responsible for each function?

4. Who does recruiting for prospective students?
   a. Do you have any recruitment activities?
   b. If so, are requirements for placement in college-level math and English shared?
   c. Who develops and runs those activities?
   d. Do you have initiatives designed to recruit minorities?

5. Who or what group makes admissions policies?

6. Please describe the general procedure through which admission and placement policies are established and modified.
   a. How often are policies revised?

7. Is there an official college policy regarding student course placement or advising? Please describe any policies/procedures for placing students into classes.

8. How does the college determine if a student needs remediation?

9. What do you think the college expects students to know and be able to do (in terms of broad knowledge/skills and specific content knowledge)? In math in particular?

10. What do you think incoming students (particularly those who enter directly from high school and wish to earn an AA degree) know about your college’s academic standards or expectations?

11. What do you think incoming students know about your college’s placement procedures? (prompt: about the fact that there are placement exams and about the kinds of knowledge and skills they need to demonstrate)

12. Please describe, in detail, the use of any placement or advising tests, including
   a. What test(s) are used for placement?
   b. By whom were the tests created/designated?
   c. Are there system-approved and administered tests? College-approved and administered? Departmentally approved and administered?
   d. When are those tests administered?
   e. When do students/prospective students learn about those tests?

13. Who goes through the placement process? Are all students assessed for placement?

14. What is the time frame in which placement decisions are made?
15. What happens if a student does not meet the standard (based on the placement test score) set by the college?
   a. Are placement decisions final? Can students appeal the outcome of the placement exam(s)?

16. What subjects do they assess?
   a. Are subject area departments involved in developing and implementing the test(s)?
   b. When (i.e., at what point in students’ life) and by whom are the tests administered?

17. Do you consider placement or advising test(s) to be “high stakes”? (i.e., what are the consequences for the student if she/he does not meet the standard?)

18. How and at what point is remediation attended to? (e.g., through college remedial courses, through intensive summer programs sponsored by ___, in the senior year of high school)

19. What types of data are maintained regarding tracking/follow-up of students receiving remediation?
   a. If such data are maintained, how are they used?
   b. Who collects, maintains, and monitors these data?
   c. In your opinion, are these data accurately identifying remediation needs? (e.g., do they underreport, overreport, neglect certain areas of need, include specific areas that are less relevant than others?)

20. Are there exceptions made to your placement and advising policies—or in what situations do you deviate from the written policies? Please be as specific as possible. (prompts and examples: if students do not meet the standard set forth by the placement exam? if students are not seeking a degree?)
   a. Who makes these decisions?
   b. If there are exceptions: In your opinion, what impact have these exceptions to the placement and advising policies had?

21. What types of remediation needs do freshmen students matriculating directly from the high school system have?

22. What is the current percentage of students requiring remediation at your institution?
   a. In math, specifically
      i. Basic Math
      ii. Beginning Algebra
      iii. Intermediate Algebra

23. Have these figures been constant, decreasing, or increasing over the past 10 years? (be as specific as possible)
24. Do you give placement exams at local high schools?
   a. If so, why?
   b. Which high schools?

25. In your opinion, what causes the need for remediation?

26. Are the results of placement tests reported back to the appropriate high schools? If so,
   a. When do results get reported?
   b. How detailed are the results? (e.g., broken down by race/ethnicity, gender, class,
      grade, individual)

27. Who receives these results, and are the results used in any way (e.g., to reform the high
    school curriculum, to link high school and college academic expectations)?

28. How do high school students learn about the contents of and consequences associated
    with your college’s placement or advising tests?

29. How do high school teachers and counselors learn about the contents of and
    consequences associated with your college’s placement or advising tests?

30. What role does diversity play in this community college?

31. How would you characterize the socioeconomic status of your student population?

32. In an ideal world, what would be the connection(s) between K-12 and higher education?

33. Would you be available for follow-up questions in the future?
The Signaling Project—Community College Faculty Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. When I use the word *signal*, I mean influential factors from high school, the local community college, parents/family, and peers that guided the student or not as decisions were made about college. What was the determination between general information and a signal? Signals would have made an impression with the student. For example, if a student’s parents were concerned about college cost, the student was signaled that it might not be affordable to go to college. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and are enrolled in Intermediate Algebra. This research will primarily target educational and personal factors that influence the students’ decisions regarding their pursuit of higher education. How do signals from family, peers, high schools, and community colleges help or hinder the students as they begin their college career?

Date

Name of the teacher:

Title of courses the teacher instructs:

Number of students taught by the teacher each semester:
Other school responsibilities of this teacher:

Teacher’s educational background:

1. Were you always good in math? What led you to teach math?

2. What is your level of familiarity regarding admission requirements and placement policies here at the college?
   a. How do you get information about those policies?

3. What do you think the college expects students to know and be able to do (in terms of broad knowledge/skills and specific content knowledge)? In math?

4. What do you think incoming students (particularly those who enter directly from high school and wish to earn an AA degree) know about your college’s academic standards or expectations?

5. What do you think incoming students know about your college’s placement procedures (prompt: about the fact that there are placement exams and about the kinds of knowledge and skills they need to demonstrate)?

6. Please describe, in detail, the use of any placement or advising tests for math, including
   a. What test is used for math placement?
   b. By whom were the tests created/designated?
   c. When do prospective students learn about those tests?
   d. Is the math department involved in developing and implementing the test?
   e. When (i.e., at what point in the student’s life) and by whom are the tests administered?

7. Describe the process used for curriculum planning for your courses. Are diversity and learning styles taken into consideration?

8. What are the relationships between this college’s placement standards and local high schools’ exit standards?

9. What types of interaction are there between high school math teachers and math instructors at the community college in your district?
   a. Is there a working relationship between you and your counterpart at the high schools?
10. How might these interactions be more useful in communicating postsecondary expectations, policies, procedures, and programs to individuals within secondary schools?

11. What types of information do faculty receive regarding advising students about how to prepare for transfer to a university?

12. Do you consider placement tests to be “high stakes”? (i.e., what are the consequences for the student if she/he does not meet the standard?)

13. What types of remediation needs do freshmen students matriculating directly from the high school have?

14. In your opinion, what causes the need for math remediation?

15. What do you think are the main reasons why some students are “college bound” and others don’t seem to be?

16. What role does diversity play in your classroom?

17. How would you characterize the socioeconomic status of your students?

18. In an ideal world, what would be the connection between K-12 and higher education?

19. Would you be available for follow-up questions in the future?
The Signaling Project—High School Principals Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. When I use the word *signal*, I mean influential factors from high school, the local community college, parents/family, and peers that guided the student or not as decisions were made about college. What was the determination between general information and a signal? Signals would have made an impression with the student. For example, if a student’s parents were concerned about college cost, the student might interpret that concern as a signal college might not be affordable. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and are enrolled in Intermediate Algebra. This research will primarily target educational and personal factors that influence the students’ decisions regarding their pursuit of higher education. How do signals from family, peers, high schools, and community colleges help or hinder the students as they begin their college career?

Date:

Name of the principal:

Number of years in education and as a principal:

Educational background:
1. Is there an official high school policy regarding student course placement or advising? Please describe any policies/procedures for placing students into classes. In particular, math?

2. What does the high school expect students to know and be able to do (in terms of broad knowledge/skills and specific content knowledge) upon graduation from high school? In math in particular?

3. What do you think incoming students from the eighth grade know about your high school’s academic standards or expectations?

4. What do you think graduating students know about the local community college’s placement procedures? (prompt: about the fact that there are placement exams and about the kinds of knowledge and skills they need to demonstrate?)

5. What role does diversity play in your high school?

6. What is the socioeconomic status of your student population?

7. Please describe, in detail, the use of any assessment or advising tests, including
   a. What test(s) are used for assessment?
   b. By whom were the tests created/designated?
   c. When (i.e., at what point in students’ life) and by whom are the tests administered?

8. Do you consider placement or advising test(s) to be “high stakes”? (i.e., what are the consequences for the student if she/he does not meet the standard?)

9. Has your high school met Adequate Yearly Progress in the state of Illinois? If not, why do you think this is? What are your strategies to remedy the situation, particularly in math?

10. Does the community college come to the high school and administer a placement test? If remediation is indicated, how and at what point is this attended to? (e.g., through intensive summer programs sponsored by whom, in the senior year of high school?)

11. What types of data are maintained regarding tracking/follow-up of students receiving remediation?
   a. If such data are maintained, how are they used?
   b. Who collects, maintains, and monitors these data?
   c. In your opinion, are these data accurately identifying remediation needs? (e.g., do they underreport, overreport, neglect certain areas of need, include specific areas that are less relevant than others?)
12. Do you know what types of remediation needs freshmen students attending the community college directly from the high school system have?

13. Do you know the current percentage of students requiring remediation from your institution at the local community college?
   a. In math, specifically
      i. Basic Math
      ii. Beginning Algebra
      iii. Intermediate Algebra

14. Have these figures been constant, decreasing, or increasing over the past 10 years? (be as specific as possible)

15. In your opinion, what causes the need for remediation? Specifically in math?

16. Are the results of placement tests reported back to the appropriate high schools? If so,
   a. When do results get reported?
   b. How detailed are the results? (e.g., broken down by race/ethnicity, gender, class, grade, individual?)

17. Who receives these results, and are the results used in any way (e.g., to reform the high school curriculum, to link high school and college academic expectations)?

18. How do high school students learn about the contents of and consequences associated with the community college placement or advising tests?

19. How do high school teachers and counselors learn about the contents of and consequences associated with college placement or advising tests?

20. In an ideal world, what would be the connection(s) between K-12 and higher education?

21. Would you be available for follow-up questions in the future?
The Signaling Project—High School Teachers Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. When I use the word *signal*, I mean influential factors from high school, local community college, parents/family, and peers that guided the student or not as decisions were made about college. What was the determination between general information and a signal? Signals would have made an impression with the student. For example, if a student’s parents were concerned about college cost, the student was signaled that it might not be affordable to go to college. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and are enrolled in Intermediate Algebra. This research will primarily target educational and personal factors that influence the students’ decisions regarding their pursuit of higher education. How do signals from family, peers, high schools, and community colleges help or hinder the students as they begin their college career?

Date:

Name of the teacher:

High school:

Title of courses the teacher instructs:
Number of students taught by the teacher each quarter/semester:

Other school responsibilities of this teacher:

Teacher’s educational background:

1. Were you always good in math? What led you to teach math?

2. Do students ask you about your own college experience?
   a. What do you tell them?
   b. Are you aware of the math requirements for the local community college?

3. What is your level of familiarity regarding admissions requirements and placement policies at the community college in your district?
   a. How do you get information about those policies?

4. Do you ever talk to students about preparing for college and the math they will need?
   a. If so, what types of conversations do you have with them?
   b. Are they student-initiated or do you initiate them?

5. What role does diversity play in your classroom?

6. How would you characterize the socioeconomic status of your students?

7. How prepared are students in this school for the local community college? What could the high school do to better prepare them?

8. Has your high school met Adequate Yearly Progress in the state of Illinois? If not, why do you think this is? What are your strategies to remedy the situation, particularly in math?

9. What do you think are the main reasons why some students are “college bound” and others don’t seem to be? Is math a barrier?

10. If students have not been in the college preparatory “curriculum path” previously, can they enter into college preparatory classes in high school?

11. Do you offer skill-building opportunities in math? How do you support students who are doing poorly in math? Do you have activities for students who are gifted in math?

12. What types of information do teachers receive from the college regarding advising students about how to prepare for college? From the counselors or administrators at this high school? Is there any communication with the math faculty at the community college?
13. How much information do you receive about the content of placement exams for first-year courses at the community college in your district? Have you ever been invited to take the placement test?

14. Does that affect your curriculum planning and development?

15. What are the relationships between your high school exit standards and the local community college’s placement standards?

16. Do you receive any feedback from the local community college regarding how your former students are doing on placement exams and in college in general (graduation/attrition rates)?
   a. How is this information reported?
   b. How do you use the information?
   c. How is the information shared within the high school?

17. Is there postsecondary-related information that you would like to receive that you currently do not receive?

18. What types of interactions are there between high school teachers and representatives from the community college in your district?
   a. Is there a working relationship between you and your counterpart at the community college?

19. How might these interactions be more useful in communicating postsecondary expectations, policies, procedures, and programs to individuals within secondary schools?

20. How might those at the high school become better informed about such policies?

21. In an ideal world, what should be the connections, or linkages, between K-12 and higher education?

22. Would you be available for follow-up questions in the future?
The Signaling Project—High School Counselors Interview

This research project concentrates on the signals students receive regarding the transition from high school to community college. For the purpose of this project, the students of interest are those who have recently graduated from high school and been placed into a remedial math course at a community college, and are enrolled in Intermediate Algebra. This research will target environmental and personal factors that influenced the students’ decisions regarding their pursuit of higher education. How did signals from family, peers, high schools, and community colleges help or hinder the students as they began their college career?

Date:
Name of the counselor:
High school:
Number of students in the advisement load:
Other job duties of the counselor:
Counselor’s educational background:

1. How long have you been a counselor? What led you to become a counselor?

2. Is there a counselor who spends 100% of his/her time on guidance and counseling?

3. Could you describe the counseling facilities at this school, including the counseling facility, support staff, technology, books, etc.?
4. At what point do counselors begin meeting with students to discuss college-related issues? Please describe those meetings.

5. What are the current responsibilities for each of the counselors? How many students are assigned to each counselor?

6. Do you have a transition program for eighth-grade students about to enter high school?

7. How do you counsel students who come into high school with few or no algebra skills? Is there an opportunity for students whose math skills are lacking to catch up?

8. What role does diversity play in your high school?

9. How would you characterize the socioeconomic status of your students?

10. At what point do counselors begin meeting with students to discuss college preparation (e.g., Grade 9, 10, 11, 12)?
   a. How often and for how long do they meet with students throughout high school?
   b. Are parents present?
   c. What goes on during such counseling sessions?
   d. Do you conduct special sessions geared toward parents?

11. Please describe how students are placed into college prep classes, honors, or dual credit?
   a. How are parents and students informed about placement procedures?
   b. If students have not been in the college preparatory “curriculum path” previously, can they enter into college preparatory classes in high school?
   c. Could you describe the differences, for example, between an honors 11th-grade math class and a nonhonors 11th-grade math class?

12. What types of information do teachers and counselors receive from your school district regarding advising students about how to prepare for community college? In particular, math?
   a. About placement exams?
   b. Are you familiar with the placement exams given?
   c. Is there any information that you would like to receive that you currently do not receive?

13. What types of admissions information do you receive from the community colleges?
   a. Do those institutions send someone to your campus to discuss admissions information with school staff?
b. Do school staff go to those campuses to receive information or attend counselor sessions?
c. Is there any information that you would like to receive that you currently do not?
d. Does the community college come to your high school to do placement testing?

14. Does the community college in your district provide information to your school regarding your students’ collegiate success (e.g., numbers requiring remediation/development prior to matriculation into the typical freshmen sequence, graduation and attrition rates, overall academic performance)?
   a. How is the information reported?
   b. How do you use the information?
   c. How is that information shared within the high school?

15. In your opinion, are high schools given enough information regarding the admission and remediation/course placement policies of community colleges?
   a. What might account for gaps in knowledge?

16. What types of interaction are there among high school teachers/staff and individuals from the community college, universities, the State Department of Education, and other educational entities? Please describe.
   a. How might these interactions be more useful in communicating high school exit policies and community college expectations, policies, procedures, and programs to individuals within secondary schools?
   b. How might those within K-12 become better informed about such policies?

17. How prepared are students in this school for education at the local community college? In particular, what has been your experience with students’ math preparation?

18. Documents to request:
   a. Statistical information including college attendance rates.
   b. Demographic information about each school and district.
   c. College and career planning information that is disseminated to stakeholders—from the district, school, and/or classroom level

19. If money were no object, how would you address the academic deficiencies of high school students?

20. Would you be available for follow-up questions in the future?
Appendix B

The Signaling Project Demographic Survey

Please mark your response by checking the appropriate answer in the space provided.

1. Your gender:  ____male  ____female

2. How many siblings do you have?  ____none  ____1  ____2
   ____3  ____4  ____5 or more
   How many of your siblings attend college or are college graduates?
   ____none  ____1  ____2  ____3  ____4  ____5 or more

3. What is your college major?
   _______________________________________________________

4. Are you currently working?  _____Full Time  _____Part Time (# of hours/week)

5. What is the highest level of education obtained by each of your parents (or guardians)?

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Father</th>
<th>Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate (or G.E.D.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education after high school other than 2-year or 4-year college (trade school?)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college (community college or some 4-year college study)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College graduate (bachelor’s degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More study after college bachelor’s degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate/professional degree (master’s/dotrate/law/medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. What high school did you attend? ____________________________________________
7. What was your overall grade point average (unweighted) in high school? (Mark one.)

   ____A/A+  ____A−  ____B+  ____B  ____B−
   ____C+  ____C−  ____D or lower

8. What math classes did you take in high school? (Please list along with grade earned.)

   ________________________________________________

9. How many honors or Advanced Placement math courses did you take in high school?

   ____none  ____1–2  ____3–4  ____5–6  ____7–8

10. Please indicate if you have taken any of the tests below. (Mark all that apply.)

    ____PSAE  ____SAT  ____ACT  ____ACCUPlACER
    ____COMPASS  ____ASSET  ____Other (please indicate) ______________

11. What is your family’s income level? Please check one of the ranges below. (All income information is confidential.)

    _____ Under $10,000  _____ >$10,000 and <$25,000
    _____ >$25,000 and <$40,000  _____ >$40,000 and <$60,000
    _____ >$60,000
Appendix C

Consent Forms

Debriefing Form

Thank you for participating in the study on signaling and students who place into remedial math shortly after high school. The purpose of the study is to investigate the effect of signals on newly graduated high school students who have tested into remedial math, and are enrolled in Intermediate Algebra in the fall of 2009.

The research questions for this study addressed the influence of signaling in the areas of family, peers, high schools, and community colleges. Interviews were conducted separately with the students, high school administrators and teachers, and community college administrators and teachers so that they would feel comfortable sharing their thoughts about college planning and not be intimidated or influenced by the presence of other students, staff, or faculty. Confidentiality and anonymity were major considerations. The transcripts and tapes of the interviews will be locked in a file cabinet in a secure location.

Again thank you very much for your participation. If you have questions, you may contact the researcher, Jervaise McGlone at 618-842-3711 or by e-mail at mcglonej@iecc.edu.
Community College Remedial Math (Intermediate Algebra) Survey
Student Voluntary Consent and Confidentiality Form

You are invited to participate in a research project designed to gather information about students who are transferring to community college directly from high school and place into the remedial math course, and are enrolled in Intermediate Algebra. Your willingness to participate is appreciated. My name is Jervaise McGlone, and I am conducting this project as a part of my doctoral dissertation under the direction of faculty member Dr. Debra Bragg, who is a professor in the Education Policy, Organization and Leadership Department at the University of Illinois.

As part of this study, I will be collecting information from you through a brief demographic survey that asks you questions about your family and high school experience. This survey will take approximately 15 minutes to complete. Questions on the survey will be exploring how your high school preparation for college course work has influenced your decision making.

I may also be collecting information from student records kept by the college, such as your high school transcript, COMPASS placement test scores, and college transcript once the fall 2009 grades have been posted. The information will be housed on a flash drive and locked in a drawer in the researcher’s office. In the event any information is available only on paper, it will also be kept secure. Just as a reassurance of confidentiality, any information collected about you personally and your academic history will be on a flash drive or paper and securely locked in a drawer in the researcher’s office without any identifying information.

I may also contact you for a short face-to-face interview to expand on your thoughts about information that might have influenced your decisions to attend a community college. The interview will be approximately 45 minutes to an hour. This interview will be audiotaped with your consent.

At the conclusion of the project, all data and materials will be archived for a period of 3 years, and then destroyed. Your participation is voluntary, and there are no foreseeable risks by participating in this study. Your decision to participate, decline, or withdraw from the study will have no effect on your grades or with future relations with the University of Illinois. You are also free to refuse to answer any questions that you do not wish to answer. Your responses will be confidential and will not be linked to your name or e-mail address. The results of this research may be disseminated as part of a dissertation, journal article, or conference presentation.

Risks associated with participation in the project are anticipated to be minimal. A potential discomfort that might be associated with the project is your participation time, but the time spent in collecting data will be as limited as is possible. Another risk might include fear of sharing specific information about yourself that might reflect negatively upon you. The researchers follow strict ethical rules of confidentiality when conducting research; responses will be reported under a fictitious name and in such a way that confidentiality is maintained. In the potential case of negative responses, no personally identifiable language will be used, to protect the identity of the respondent when disseminating results. With these risks in mind, the benefits to the educational community outweigh these risks.

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If you have questions or concerns, please contact Jervaise McGlone 618-842-3711 (work) or by e-mail at jmclgone@uiuc.edu or Dr. Debra Bragg at 217-244-8974 or e-mail at dbragg@uiuc.edu. If you have questions about your rights as a participant in this study, please contact the Bureau of Educational Research at 217-333-3023 or the University of Illinois Institutional Review Board at 217-333-2670 or by e-mail at irb@uiuc.edu. Please keep a copy of this for your records.

My signature below indicates I 1) have read and understand the above information, 2) voluntarily agree to participate by completing a survey and being interviewed, 3) understand I will receive a $10 bookstore certificate for the interview participation, 4) assure that I am 18 years of age or older, and 5) have been offered a copy of the consent form.

__________________________  ______________________
Signature                          Date

Yes _____ No _____ I’m willing to be interviewed.

The best way to reach me is phone # ____________________ e-mail ____________________

Yes _____ No _____ I agree to allow my interview to be audiotaped for transcription only.

__________________________  ______________________
Signature                          Date
Community College Remedial Math (Intermediate Algebra) Survey
Administration and Faculty Voluntary Consent and Confidentiality Form

You are invited to participate in a research project designed to gather information about students who are transferring to community college directly from high school and place into the remedial math course, and are enrolled in Intermediate Algebra. Your willingness to participate is appreciated. My name is Jervaise McGlone, and I am conducting this project as a part of my doctoral dissertation under the direction of faculty member Dr. Debra Bragg, who is a professor in the Education Policy, Organization and Leadership Department at University of Illinois.

As part of this study, I will be collecting information from students through a brief demographic survey that asks questions about their family and high school experience. With their permission, I will conduct a short face-to-face interview to expand on their thoughts about information that might have influenced their decisions to attend a community college.

To support and add an additional dimension to the study, I would like to interview community college administrators and faculty as well as high administrators and teachers. The interviews will be approximately 45 minutes to an hour and will be audiotaped with your consent.

At the conclusion of the project, all data and materials will be archived for a period of 3 years, and then destroyed. Your participation is voluntary, and there are no foreseeable risks by participating in this study. Your decision to participate, decline, or withdraw from the study will have no effect on students’ grades or with future relations with the University of Illinois. You are also free to refuse to answer any questions that you do not wish to answer. Your responses will be confidential and will not be linked to your name or e-mail address. The results of this research may be disseminated as part of a dissertation, journal article, or conference presentation.

Risks associated with participation in the project are anticipated to be minimal. A potential discomfort that might be associated with the project is your participation time, but the time spent in collecting data will be as limited as is possible. Another risk might include fear of sharing specific information about yourself that might reflect negatively on you. The researchers follow strict ethical rules of confidentiality when conducting research; responses will be reported under a fictitious name and in such a way that confidentiality is maintained. In the potential case of negative responses, no personally identifiable language will be used, to protect the identity of the respondent when disseminating results. With these risks in mind, the benefits to the educational community outweigh these risks.

If you have questions or concerns, please contact Jervaise McGlone at 618-842-3711 (work) or by e-mail at jmeglone@uiuc.edu or Dr. Debra Bragg at 217-244-8974 or e-mail at dbragg@uiuc.edu. If you have questions about your rights as a participant in this study, please contact the Bureau of Educational Research at 217-333-3023 or the University of Illinois Institutional Review Board at 217-333-2670 or by e-mail at irb@uiuc.edu. Please keep a copy of this for your records.
My signature below indicates I 1) have read and understand the above information, 2) voluntarily agree to participate by participating in an interview, 3) assure that I am 18 years of age or older, and 4) have been offered a copy of the consent form.

__________________________  __________________
Signature                                           Date

Yes _____ No _____ I’m willing to be interviewed.

The best way to reach me is phone # _________________ e-mail __________________

Yes _____ No _____ I agree to allow my interview to be audiotaped for transcription only.

__________________________  __________________
Signature                                           Date