Work-In-Progress: Applying Transition Theory to an Exploration of the High School-to-College Transition Experiences of Students from Underrepresented Ethnic/Racial Groups

Abstract

Student support programs within colleges of engineering often aim to assist students during their transition from high school to college. While studies of this transition can characterize experiences that could support the design of these support programs, research commonly focuses on the broader student population, where engineering students are often the minority. To further improve student support programs in engineering, particularly those designed for students from traditionally underrepresented populations, additional research is needed to understand the transitional experiences of first-year engineering students. The purpose of this paper is to explore the applicability of a theoretical framework from adult development (i.e., Schlossberg's Transition Theory) to examine the high school-to-college transition of engineering students from underrepresented racial/ethnic groups. In the work-in-progress paper, we describe the theoretical constructs that appear most applicable in this context as we begin coding data from a series of three interviews with each participant. Our results will advance the engineering education community's understanding of the applicability of Transition Theory for examining the transitions of students into engineering and inform future work.

Motivation

Transitioning from high school to college is a pivotal period in the educational journeys of engineering students. Given the underrepresentation of African American and Hispanic/Latinx students in engineering, there is a heightened interest in ensuring that students from these groups (hereafter referred to as underrepresented minorities, or URMs) have positive experiences in engineering programs early on in their education. This heightened interest is evidenced by the plethora of support programs intended to ease transitions and promote student retention. Colleges of engineering often invest considerable resources in educational practices to support first-year students, such as summer bridge programs [1], mentoring programs [2], and living-learning communities [3], [4].

One way of improving educational practices is through educational research, which can inform the effective use of resources invested to support students. Research on engineering students' transitions from high school to college provides insight into how students adapt to their new surroundings and can impact the design of engineering-specific student support programs. Despite the numerous investments in resources and programs to support students' transitions from high school to college, the transition process in the context of engineering is undertheorized. Although student support practitioners know a lot about first-year engineering students through their years of experience, minimal systematic and in-depth qualitative research has explored the high school-to-college transition for underrepresented engineering students. We aim to contribute to this gap in literature by using Transition Theory [5] to underpin a research exploration of underrepresented students' high school-to-college transition. Our work aims to connect research to practice by providing insight into what it *means* for a student to transition from high school to college, highlighting how practitioners might best support engineering students during this critical time.

Purpose

This paper is situated in a larger research project that seeks to understand the transitions of underrepresented engineering students from high school to college. The purpose of the broader project is to explore 1) how underrepresented students transition into engineering degree programs, 2) how individual student factors influence their transition, and 3) how institutional contexts influence the transition. Accordingly, the purpose of this work-in-progress paper is to explore the applicability of a theoretical framework from adult development (i.e., Schlossberg's Transition Theory) for examining the high school-to-college transition of engineering students from underrepresented racial/ethnic groups. The subsequent sections examine the development of a codebook grounded in Schlossberg's Transition Theory [5] to articulate the categories through which African American and Hispanic/Latinx students' reflect on their own transition into college. The theory and codebook provided language that illuminates the coping strategies and supports that underrepresented minority engineering students use during their first year in college.

Theorizing the Transition from High School to College

We use the sociocultural perspective to theoretically frame our exploration of the transition from high school to college. The sociocultural perspective emphasizes "how individual, social, and contextual issues impact human activity, especially learning and behavior" [6, p. 12]. We use the sociocultural perspective to examine the interaction between an individual and their environment—where environments include social, cultural, and institutional contexts [6]. More specifically, we use the sociocultural perspective to explore personal (i.e., individual) and environmental influences on underrepresented students' transitions from high school to undergraduate engineering programs. Figure 1 provides a summary of the sociocultural perspective used to frame our overarching study.
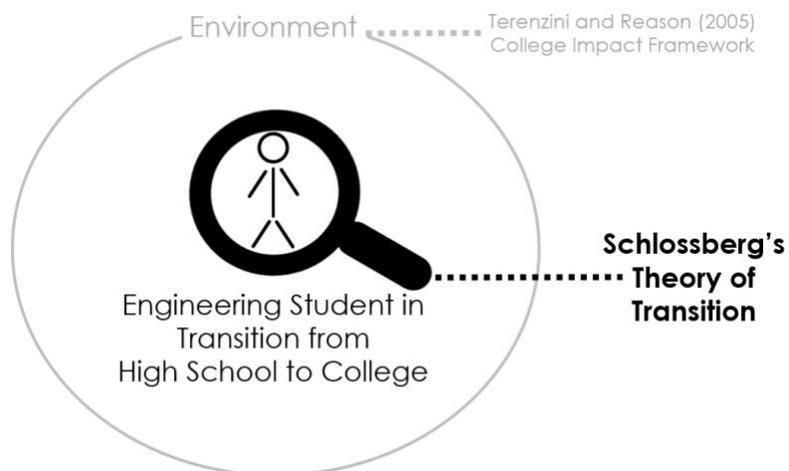

Figure 1. Sociocultural perspective forming the conceptual framework for this study

Rooted in a sociocultural perspective, we use Terenzini and Reason's [7] Conceptual Framework for Studying College Impacts as a lens for analyzing environmental influences on engineering students' transition from high school to college. Terenzini and Reason's [7] framework suggests that a student's transition to college is shaped by the organizational context, including: internal

policies and practices, academic and co-curricular programs, and faculty culture. The framework also highlights the influence of the peer environment on students' transitions, including classroom experiences, out-of-class experiences, and curricular experiences. Terenzini and Reason's [7] Conceptual Framework was developed in the context of first-year engineering programs, providing appropriate alignment with our research context.

In addition to *environmental* influences on transition, we are also examining individual aspects of transition. This includes an individual's perceptions of the transition and interactions with the transition environment. Because Terenzini and Reason's [7] framework systematically examines *environmental* influences on transitions, our work herein focuses on developing a systematic lens for understanding the *individual* aspects of transition. To theoretically underpin our exploration of underrepresented engineering students' individual aspects of transition, the subsequent sections explore the applicability of Schlossberg's Transition Theory [5].

Schlossberg's Transition Theory

Schlossberg's Transition Theory [5] was developed in the context of adult development, aiming to provide a framework for counselors working with individuals who are experiencing a period of transition. Schlossberg delineates three main phases of a single transition: (1) approaching transitions, (2) taking stock of coping resources, and (3) taking charge [8]. The first phase, approaching transitions, focuses on understanding more about the transition—including how it influences a participant's roles, relationships, assumptions, and routines. During the second phase, an individual takes stock of coping resources that may help work through a transition. Lastly, during the third phase, an individual accesses or activates strategies to navigate the transition. Put simply, this entails identifying a transition, experiencing the transition, and moving on or past the transition.

All three phases of transition outlined by Schlossberg's Transition Theory were considered in this broader project, through both the development of our research protocols and data analysis plan. For example, the first phase of transition—approaching transitions—was used primarily in the development of interview protocols for our initial interview with each student, focusing on exploring how students were identifying and understanding the approaching transition. This work-in-progress paper focuses on the development of our codebook, which emphasizes the second and third phases of transition: taking stock of coping resources and taking charge. We also illuminate the situations that become salient as students navigate the transition from high school to college.

Within the second phase of a transition, Schlossberg defines a 4S system of taking stock of coping resources, where the 4S's include *Situation*, *Self*, *Support*, and *Strategies* (see Table 1). By identifying four factors that influence a person's ability to cope with a transition, the 4S system outlined in Schlossberg's second transition phase provides a framework for more holistic exploration of transitions experienced by URM first-year engineering students.

Research Design

The purpose of the broader project is to explore URM first-year engineering students' transitions from high school to college, examining both individual and environmental factors that may impact transition. To address our larger purpose, we conducted an exploratory, multi-case study.

African American and Hispanic/Latinx engineering students were interviewed at three pivotal points during their first year at the institution. Interview questions were designed using Transition Theory in order to allow students to reflect on their experiences while in college. We developed a codebook to analyze student interviews, drawing from the 4S system in the second phase of Schlossberg's Transition Theory [5]. The methods for our broader research project are briefly discussed below, followed by an overview of our codebook development and preliminary results.

Table 1. Schlossberg's 4S System of Taking Stock of Coping Resources

4S Component	General Definition	Definition in the Study Context
Situation	Captures what happened as it relates to what else is going on for the individual, the duration, and the impact of the (non-)event.	A situation explains an event or non-event that a URM first-year engineering student in the transition period from high school to college might be facing. It involves what is happening in the student's life, such as a role change or some concurrent stress.
Self	How the individual perceives the situation; an individual's outlook.	Self refers to the URM first-year engineering student's outlook during transition from high school to college. It includes personal characteristics as well as psychological resources.
Support	Types of support that an individual chooses to access or activate during a situation.	Support involves the help that is available (including, but not limited to human, physical, and financial resources) to the URM first-year engineering student during their transition from high school to college.
Strategies	Positive and negative techniques or coping strategies that an individual uses to resolve a situation.	Strategies describe how the URM first-year engineering student copes with the transition from high school to college.

Context and Participants

The research site was a large, predominantly white research-intensive institution. Participants were recruited via a survey distributed to African American and Hispanic/Latinx first-year engineering undergraduate students. From the survey results, 12 participants were purposely selected to ensure the researchers were able to interview a variety of students from different backgrounds. A total of 10 students completed the series of three interviews.

Data collection

We collected data using a longitudinal series of three semi-structured interviews [9]. Students were interviewed at three pivotal points during their first year at the institution: within the first two weeks of their first semester, after midterm grades during their first semester, and at the beginning of their second semester. All students were provided an Amazon gift card for their participation in each interview. Interviews were transcribed by a professional transcription service and all identifying information was removed prior to analysis. All research protocols were approved by the Institutional Review Board. Additional data collection used for analysis include interviewer memos and researcher knowledge of the institutional context.

Data analysis

The participant interviews will undergo three cycles of coding. For the purposes of this paper, we will only highlight the first two cycles of coding as the third cycle pertains to future work. The first cycle of coding was person-centric and emphasized the transition from high school to college. In this cycle, the researchers conducted emergent coding and looked for Schlossberg's 4S's (strategies, support, self, and situation). To provide initial boundaries on the strategy codes, we applied the coping strategies framework from Skinner [10]. The researchers conducted a priori coding to capture the nature of support (e.g., peer in a classroom setting, peer from pre-college setting) described by participants as important to their transition. Categories of self and situation were analyzed using emergent codes.

Preliminary Results: Illustrating the Applicability of Transition Theory

These preliminary results provide an overview of the codebook as it describes different coping strategies and supports that URM engineering students use during their first-year in college. This section begins with an overview of the coping strategies, self, and situation codes that were used, followed by specific examples that emerged from the interviews. The support codes were developed both through emergence and a priori in considering the aspects of the home environment. Examples from the interviews are also presented.

Strategies

Strategies refer to the approaches that students employ while undergoing their transition. There are three categories of strategies, including what the student does to modify their situation, how the student takes control of the meaning of the problem, and how the student manages the stress after the situation has occurred [10], [11]. Of the three types of categories, an individual can engage in four different coping modes. They can seek information, have intrapsychic behavior, take direct action, or inhibit action when undergoing a transition. Table 2 highlights an example of each of the three categories of strategies that emerged from the interviews.

Table 2. Sample Codebook for Strategies

Subcode	Definition[1]	Example
Problem-	Adjust action to be effective (e.g., strategizing,	"Yeah, I missed a math quiz because ... I don't know, it's a little different. The

Subcode	Definition[1]	Example
Solving	instrumental action, planning). These are active, constructive, and problem-focused means to change a situation.	teachers aren't hounding you every single day, like, "Hey, get this in, get this in." So I missed that, and I immediately went and bought a calendar."
Negotiation	Find new options (e.g., bargaining, persuasion, and priority-setting). Active attempts to work out a compromise between the priorities of the individual and the constraints of the situation. Allows for the creation or discovery of additional options.	"First, I think what do I have to do tonight, and can I do it later? If I can't do it later, then I definitely have to do school first, but if I can do it later, I'll just be like, "All right, let's go." Maybe the next day, I'll wake up maybe an hour earlier and do it."
Escape	Escape noncontingent environment (e.g., cognitive avoidance, behavioral avoidance, denial, wishful thinking). Efforts to disengage or stay away from the stressful transaction (some motion forward- "flight"- I'm leaving)	"This sucks. I don't even want to study for this chem test."

[1]Note: Skinner (2003) is original source for Strategy codes

Problem-solving is an example of what a student does to modify their situation. In the problem-solving example in Table 2, the student reflects on the differences between high school and college and how they missed a math quiz due to these differences. The student bought a calendar in order to prevent themselves from missing another quiz. Negotiation is an example of how the student takes control of the meaning of the situation. Negotiation involves the bargaining nature of trying to decide between multiple options. In the example above, the student discusses their thought process of when to work on an assignment. Lastly, an escape is an example of how a student manages their stress after a situation has occurred. In the example above, the student expresses how they want to disengage with the stressful situation, which for them is chemistry.

Support

Support involves the resources and people that the students utilized during their transition. Anderson and colleagues [8] operationalize support by its source, which can be an intimate relationship, family units, friend network, or the institution or community of which an individual belongs. Table 3 highlights examples of the support that students utilized during their transitions.

Table 3. Sample Codebook for Support

Subcode	Definition	Example
Peer at the Institution, Classmate	Participant refers to support from a peer with whom they share a class(es)	"My one friend, [name], I have chem lab with him, I have engineering with him and I have chem with him. Which we kind of did chem lab on purpose because we knew that we wanted to have a decent lab partner because it makes all the different in the world. "
Course Instructor	Participant refers to support from a course instructor (e.g., faculty member who is teaching their course; or all staff leading that course section)	"The teachers all want you to succeed, and they're really enthusiastic about helping you."
Health	Participant refers to support from health resources	"I was talking to my psychiatrist about this too"

Subcodes that emerged from support were related to the various types of peers with which the student engaged and interacted. In the example above, the student mentions how helpful it was to have a peer classmate in their chemistry lab. While this subcode focuses on a peer in their class, students also mentioned peers outside of their classroom and beyond the institution. In addition to peers, some students also mentioned support from a course instructor or health resources such as a psychiatrist.

Self

Self involves the emotions and outlook that a person experiences when they encounter a situation. Table 4 highlights examples of self that were expressed when discussing their transitions.

Table 4. Sample Codebook for Self

Subcode	Definition	Example
Positive Outlook	Feel they have control over their life/the situation and/or have the power to control at least some aspects - "It's going to be ok"	"I am pretty confident of the sheer fact that I'm confident that I can turn up the pace this semester."
Negative Outlook	Focuses on the negative aspects of the situation and its potential impact on themselves	"So we're gonna try to get at least an A on that, because knowing me I'm probably not going to do as well on the final."

At several points during a transition, students would either have a positive or negative outlook on their experience. In the example above, the student had an overall positive outlook on the rest of their semester whereas in the second example, the student had a negative viewpoint on how they would do on their final exam.

Situation

A situation refers to the event or non-event characteristics. It involves what is happening to the student. Table 5 shows a subset of the codes that emerged from the situation.

Table 5. Sample Codebook for Situation

Subcode	Definition	Example
Triggers	Experiences that cause individuals to look at themselves and their lives in new ways (death in the family)	"...The whole [club] crew. We were all cheering. It got me motivated to study harder. That way I can get that 3.0, get into that aerospace…"
Classroom Experiences	Work or experiences specific to one course (including general coursework/homework and interactions with the teacher); experiences unique to the section of a course they're actually enrolled in; their interaction with the content, instructor, or peers.	"I'm finding math challenging, even though I took BC calc and it's literally the same class. I'm still struggling 'cause you go so much more in-depth. But I'm glad I took it again because I get a stronger foundation for math."

Subcode	Definition	Example
Co-curricular Experiences	Experiences that mirror academia (i.e., engineering related) but are not in the traditional classroom setting (LLC, STEP, NSBE, etc.)	"I'm in [living learning community] as well. They require two social events, [living learning community] sponsored, two professional development, and two academic, a lot of service learning. For a lot of the service learning stuff, they fill up so fast, it's crazy."

A trigger refers to something that stimulates the student to look at themselves in a different way. In the example above, the student mentions how their involvement in the club motivated them to study harder so that they can achieve a 3.0 Grade Point Average. A classroom experience refers to an experience that a student has within the context of a single course. In the example above, the student mentions the difficulty of their math class. Co-curricular experiences involve experiences that take place outside of the traditional classroom setting. In the example, the student describes the types of events that they do in their living learning community.

Future Work & Conclusion

In conclusion, we presented the codebook developed to examine the experiences of URM students in engineering through a sociocultural lens. Although we have only included the first two rounds of coding, we are currently conducting a third cycle of coding to look across the experiences of the students in order to create a comprehensive model of influences on student learning and persistence. By integrating Transition Theory with student support practice, we can better understand the diversity of experiences of students in the first year and provide evidence-based recommendations to student support centers and programs. In addition, we support future research in this space by presenting a list of coping resources that African Americans and Hispanic/Latinx students can use during their first-year experience.

Acknowledgements

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