Facilitating Low-Income and/or First-Generation College Student Success: A Literature Review

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This survey of literature on low-income and first-generation (LIFG) college student success focuses on three key components: *common barriers* to student success; *intersections and syntheses* of those barriers; and *best practices or solutions* to overcoming those barriers. At some junctures, the review—which is not intended to be comprehensive—focuses only on barriers common to low-income (LI) or first-generation (FG) students, and much of the review draws from FG literature; however, when possible, every effort has been made to focus on barriers and solutions that affect both LI and FG students. Still, it is important to recognize that multiple differences exist between and within these groups.

The definition of both types of students varies. LI students in the U.S. are generally identified by the federal government as those whose family or individual earnings fall below the Federal Poverty Line (Metz, 2010). However, LI students can also be identified as individuals who do not themselves (or their families) make a living wage, which measures the income necessary to meet basic needs (Glasmeier, 2010). Due to cost-of-living variations, living wage standards are (much) higher than the Federal Poverty Line. FG students are sometimes defined as those who have had neither parent attend college or those who have had neither parent earn a baccalaureate degree. Another definition identifies FG students as those whose parents have no education beyond high school (Ward, Siegel, & Davenport, 2012, pp. 3-5). A comparison of FG, LI, and non-FG student traits appears in the Appendix (from Davis, 2010). Below, key concepts are italicized.

I. Barriers

One barrier that runs throughout all the other barriers is *belonging uncertainty*. This phrase initially emerged from research contrasting White and Black college students' responses to diverse scenarios in an academic setting; in one scenario, students were in a circumstance in which they were led to believe they would have few friends, and a contrasting scenario that placed them in a condition of social belonging (Walton & Cohen, 2007). In the first and second scenario, White students' performance was unchanged. By contrast, in the first scenario Black students saw a decrease in their self-perceived potential and an increase in belonging uncertainty; in the second scenario, designed to decrease belonging

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uncertainty, Black students' grades increased. The authors define belonging uncertainty for academic and professional settings as a state in which "members of socially stigmatized groups are more uncertain of the quality of their social bonds and thus more sensitive to issues of social belonging" (Walton & Cohen, 2007, p. 82).

Sometimes, LIFG students are part of socially stigmatized groups. Some LIFG students are part of a stigmatized racial, gender, sexual orientation, or social class minority group, among others. However, belonging uncertainty can also work on more subtle levels since some LIFG students can be or "pass" as a member of a non-socially stigmatized group. In many circumstances, one's social class background can be partially to largely hidden, for example, as can whether one's parents attended or graduated from college. Yet belonging uncertainty is also an implicit theme running through the LIFG literature, and relates directly or indirectly to all the issues noted in Figure 1. Figure 1 also accentuates a timeline ranging from pre-collegiate experiences to collegiate experiences that shape academic success. Below, we elaborate on each of the potential barriers noted in Figure 1.

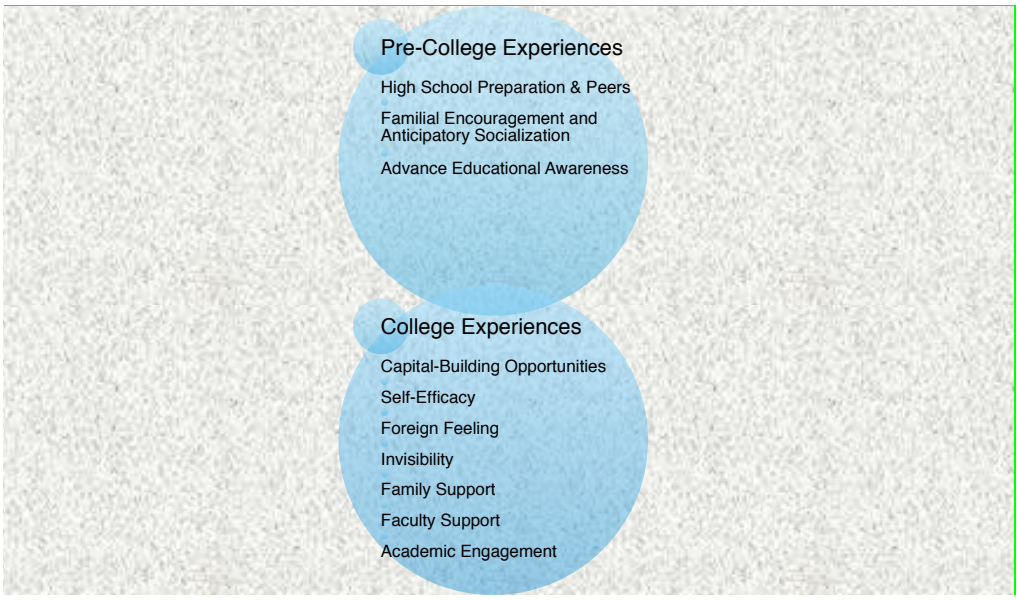

Figure 1: Belonging Uncertainty and Related Pre-College and College LIFG Barriers

A. Pre-College Barriers: Cultural Capital

Cultural capital refers to information and beliefs about a topic—in this case, education. Such capital is not inculcated over a short period of time, but over lengthy stretches of time. Parents who have graduated from college can provide their children with cultural capital just by being who they are: by the language they use, by their modes of thinking and problem solving, by how they adjust and fit into their social strata, by how they navigated social mobility hurdles, and much more. Students whose parents did not attend or graduate from college may lack the cultural capital that they could otherwise pass down to their children

(Ward et al., 2012). For FG students, cultural capital involves knowledge about getting into college—including information and experience on "researching institutions, making informed decisions, applying to schools, locating financial resources, developing expectations, and learning the language and terminology of college life" (Ward et al., 2012, p. 7). Yet it also involves knowledge about succeeding in college, such as "locating campus-based resources, developing friendships and social connections, learning how to navigate the academic curriculum, participating in campus activities, and making progress toward graduation" (Ward et al., 2012, pp. 7-8). The aforementioned definitions of an FG college student matter in part because they each involve differing degrees of parental cultural capital that can be passed down to children.

Cultural capital has several sub-categories related to pre-college experiences: those include but are not limited to high school preparation, familial encouragement and support, anticipatory socialization, lack of information about college services, and advance educational awareness.

A.1 High School Preparation and Peers

FG students often attend high schools that do not provide them with the skills they need to thrive in college (Cushman, 2006). Their parents' income may play a big role, because a familial lack of finances may mean they enroll in local high schools in which peers have lower reading, math, and critical thinking skills. As a result, FG students may feel as if they cannot reach the same heights as students who had a more thorough high school preparation. The lack of a strong high school academic program is an obstacle in college to developing self-efficacy, (Cushman, 2006), and can contribute to a sense of belonging uncertainty in college. Also, cultural "peer capital" matters. High school students' values are shaped by their peers, so high school cultures with higher percentages of college-bound students enable FG students to pick up some cultural capital from non-FG peers, whereas high schools that have lower percentages of college-bound students may have less available cultural peer capital that promotes college success.

A.2 Familial Encouragement and Anticipatory Socialization

Encouragement and support from family have been seen as crucial in boosting students' confidence and joy of learning. In fact, consistent encouragement and support from family is as important in shaping FG student success as family income (Ward, Siegel, and Davenport 2012). Also, LIFG students sometimes feel they have more at stake, thinking that college is the best way to help their family.

Unlike college students whose parents graduated from college, FG students cannot draw from the lived experiences of parents who understand the total college experience, from admission to graduation, and all the hurdles in between. Some scholars call this a lack of *anticipatory socialization* from parents (Ward et al., 2012). Information, beliefs, and norms are transferred to students whose parents graduated from college that serve as often-invisible advantages in

promoting college success; by contrast, FG students can be invisibly disadvantaged by the lack such parental socialization.

A.3 Advance Educational Awareness

FG students generally receive less cultural capital in many forms, such as not being able to take full advantage of college services that shape their future career (Cushman, 2006). Lack of information about college services can include the role of advisors, financial aid services, student associations, alumni networks, and faculty. Students may also struggle to connect and make friends with students from other social classes, which can be an obstacle for group study and team projects (Cushman, 2006). Lack of knowledge about the existence or workings of the financial aid system has an impact on the incentive of FG students to enroll in college (Tierney & Hagedorn, 2002). Furthermore, FG students are more likely (than non FG students) to drop out of college because of the lack of financial aid (Tierney & Hagedorn, 2002), which is often also true of LI students.

LIFG students can also lack awareness about college majors, especially in STEM fields (Lam, Mawasha, Srivatsan, & Vesalo, 2004). The absence of the latter information appears to be a barrier since it limits the career choices of LIFG students. More importantly, the knowledge gained about a college program and environment before attending the school has an important impact on the learning process, motivation, and self-confidence (Lam, Mawasha, Doverspike, McClain and Vesalo 2004).

B. College Barriers: The Four Capitals—Human, Cultural, Social, and Financial

Although the pre-college foundation matters, so too does what occurs during the college years. In investigating broad origins of social inequality, four forms of capital surface as crucial: human, cultural, social, and financial capital (Schwalbe, 2007). The discussion below draws heavily from Schwalbe's book, *Rigging the game: How inequality is reproduced in everyday life* (2007).

Human capital generally includes descriptions we tend to place on a resume: credentials, skills, and work experience we have accumulated over time (Becker, 1994). *Cultural capital* includes the knowledge, habits, values, skills, and tastes one acquires growing up in a particular social environment; although everyone has cultural capital, not everyone has the kind necessary to act and interact competently in middle and upper-middle class contexts (DiMaggio, 1982; Lamont & Lareau, 1988). *Social capital* might be thought of as one's real or mental Rolodex or Contacts. The power and leverage inherent in some connections within a social network vary greatly (Jackall, 2009). Although all have social networks, these vary in size and usefulness in steering people to jobs, resources, and knowledge (Portes, 1988). Finally, the easiest capital to understand but the most lacking for some is *financial capital*, or, money (Schwalbe, 2007). Scenario 1 explores the four capitals.

Scenario 1: Imagine two young men between their junior and senior year of high school, Carl and James. Both want to go to college and are seeking summer employment. Carl's father is a welder and through friends gets Carl a full-time summer job as a welder's assistant. James' father is a wealthy lawyer, and lands James a job as a full-time golf caddy. While both jobs were bolstered by their respective fathers' social capital, the jobs may result in different kinds of human, cultural, and financial capital. Whereas Carl works hard learning the intricacies of working with metal at high temperature, James does not; driving a golf cart and serving as a caddy are familiar, as he'd done both before with his father and father's friends. So on the human capital front, Carl may seem to have an advantage. However, James is acquiring a different kind of cultural capital by rubbing elbows with and making sure he gets good tips from wealthy patrons, a skill that will be quite useful in future navigations of middle and upper-middle class environments. In terms of cultural capital, Carl also learns to ensure customer satisfaction, even if his customers come from a wider array of social class backgrounds. However, his customer contact is quite limited due to his steep learning curve as an apprentice. Carl's wage is significantly higher than James,' but after tips, James earns about the same as Carl. Carl places his earnings in a savings account for his dream of going to college, while James, who does not need to worry about college expenses, spends his money on entertainment, food, and clothes.

In Scenario 1, both jobs are good preparation for college, as they require the hallmarks of good employees: punctuality, a positive attitude, openness to learn, communication, teamwork, and more. But James has developed certain advantages; he's likely much more familiar with how to interact with middle and upper-middle class people, learning to cater to their tastes and desires. Carl also learns to cater his work to the tastes and desires of an experienced welder, also a useful skill. But Carl's limited customer contact may mean he's less familiar with navigating middle and upper-middle class social contexts. While the four capitals inform students' pre-college experiences and perspectives, the consequences of the capitals often manifest themselves during the college years. Notice how the four capitals play a role in each of the sub-themes below.

B.1 Self-Efficacy

It is one thing to be admitted to college. But it is another to have self-confidence that you will be successful in that context. That academic self-confidence is called *self-efficacy* (Ward et al., 2012), which is shaped by multiple sources. Self-efficacy is sometimes called academic self-concept, how one sees oneself as a student, and it is connected to persistence and success in college.

B.2 Foreign Feeling

Some FG college students report feeling like the university context is a foreign land, full of strange rituals, norms, and mores, ones so unfamiliar to them that it is as if they have landed in a completely different culture (Ward et al., 2012). FG students have been compared to athletes always playing an away game (Ward et al., 2012). The lack of familiar faces, support, and food play an impact on their

health, adaptation, and grades. That *foreign feeling* can shape their level of comfort in and outside the college classroom, affecting learning, socialization with professors, peers, and more. In particular, non-FG students may be (or appear to be) more privileged (Cushman, 2006). Some FG students report a foreign feeling more often while discovering college for the first time (first year, especially first semester). The foreign feeling is particularly acute when students are ethnic/racial minorities on their campus, which can contribute to making students feel like they do not belong there. This foreign feeling usually affects the learning process and adaptation in the new environment (Cushman, 2006). Overall, the foreign feeling may emerge from or be exacerbated by not having the same degree of any or all of the four capitals as one's college peers.

B.3 Invisibility

The unique academic needs to each FG student sometimes remain invisible on campus. Some campuses do not collect information on FG status, so FG students may not be identified as students who could benefit from focused assistance. Also, some FG students have no need for focused assistance, and may even feel that being identified stigmatizes them unfairly or unnecessarily. However, for those students with particular FG-related needs, the *invisibility* of their individual needs can hinder their success (Ward et al., 2012).

B.4 Familial Support

Some FG college students report feeling like they have to "straddle two cultures: that of the college community and that of the home environment" (Harvey & Housel, 2011, p. 2). As noted above, the degree of encouragement and support from family has been identified as in some ways more important in college student success than family income. *Familial encouragement and support* is typically lower among FG students than non-FG peers (Ward et al., 2012, p. 8). In fact, FG students are sometimes victims of tension at home. Parents are not always supportive when it comes to FG students moving (especially far away) to pursue their college degree, which might violate familial norms or expectations. Often, the family is reluctant to let them go, creating tension when the FG students most need support in their transition into the new environment. That tension can mean FG students have to live at home (generally for financial reasons), or live on (or near) campus, a tension that can cause the sense of being alone in the new adventure; both living situations can negatively affect academic success. Also, students' family culture can have an impact on how well FG students take full advantage of their college experience, especially if the FG students do not go to the college of their choice (Ward et al., 2012).

B.5 Faculty Support

Since FG students usually lack the necessary support and encouragement from their parents, it is necessary for faculty, after identifying FG students, to provide them with the right motivation and exposure to critical academic information (Espinoza, 2011). Such resources need to occur both in high school (exposure to advance education) and in college (information on how to be successful in

advance academic education). Such resources not only boost FG student self-efficacy, but also increase their success in obtaining a degree (Espinoza 2011). However, some FG students perceive the college environment as unsupportive, partially because faculty do not take the time to understand the background of FG students; this student-faculty connection can worsen if FG students are ethnic minorities in a predominately White institution (Ward et al., 2012).

B.6 Academic Engagement

Unlike college students whose parents graduated from college, FG students can lack the knowledge of how important it is to interact with faculty during and outside of class. The degree of interaction with faculty has an impact on students' grades and their intellectual development. In that sense, FG students are at disadvantage vis-à-vis their peers who might have received this knowledge from parents. That is why *academic engagement* is lower among FG students than non-FG students (Soria & Stebleton, 2012). Similarly, from their parents, FG students do not always receive information on the importance of participating in extra-curricular activities, studying in groups, asking questions of professors during office hours, and using the school support services. As a result, they may be a step behind their peers when it comes to fostering development and success (Soria & Stebleton, 2012). Among other factors, low self-efficacy and lack of faculty support can exacerbate low levels of academic engagement.

Scenario 2: Megan and Mellissa are best friends and both determined to succeed in college. They have all but two of their classes together, a schedule they designed intentionally. Some tension in their friendship is beginning to emerge; they both sense it but don't know what to do about it. Megan's parents did not go to college, and Mellissa's parents both have college degrees. Megan works full time in the summers, and during the academic year, she works 25 hours a week and takes 18 credits a semester; she does not want to be a financial burden on her struggling parents, and she needs the money to pay for food, clothing, gas, and other necessary expenses. Mellissa takes 15 credits but does not need to work in a job, so she is involved in intramural sports as well as two on-campus clubs. Although Megan wishes she had the luxury to just be like Mellissa and not also have to work, she is not envious of Mellissa. Mellissa—who is bright, funny, and always supportive—is one of the best friends she's ever had. One of the key sources of tension is that Megan does not have time to do things with Mellissa. Mellissa understands that Megan does not work so many hours by choice, yet because she knows how smart and talented Megan is, she wishes Megan had more time to dedicate to participating in study groups and doing more resume- and network-building (and stress-releasing) activities like sports and clubs. How can this good friendship be saved while also augmenting as many of Megan and Mellissa's four capitals as possible?

Scenario 3: Kaitlyn grew up in a college town, surrounded by kids whose parents were professors, doctors, lawyers, and other college-educated professionals. But Kaitlyn's own parents did not have the opportunity to go to college, as Kaitlyn's grandparents did not have the financial means. Kaitlyn's

parents are divorced and her mom works as an administrative assistant, her dad as a clerk in the county courthouse. Sarah grew up in a rural area. Her parents are divorced, and her mother has remarried. Her father is a cognitive psychologist and her mother a dental hygienist. Her stepfather is a dentist. Kaitlyn and Sarah are roommates and live near their community college. They both like rock climbing, music, literature, and chemistry, their planned major. What sources of tension might emerge in their friendship? What forms of capital might they have in common and on which ones might they differ? How might they best connect and mutually promote each other's adjustment to college, increase belonging certainty, and share knowledge and insights on the four capitals?

II. Synthesis, Intersections, and Analysis of Barriers

How do the above barriers connect and intersect? One way to synthesize the above barriers is to show how they can intersect. Since LIFG college students can lack the anticipatory socialization from parents, if they do not get that socialization from other sources, they may enter college with less cultural and other forms of capital. That lack of capital can cause them to misinterpret or misunderstand educational resources, study habits, socialization cues, or other factors that contribute to their academic success. Over time, high effort and low performance and/or an inability to fit in socially, due in part to a lack of cultural capital, can negatively affect their sense of self-efficacy (Ward et al., 2012). If the foreign feeling remains, low self-efficacy can grow, along with a burgeoning sense that "I do not belong here." Each of the potential barriers can be both causes and effects in a complex set of possible intersections. For instance, low self-efficacy can lead FG students to try to draw from parental cultural capital, which if missing or inadequate, can exacerbate the foreign feeling in an academic context. If students' FG-related needs remain invisible, students who have the academic ability to succeed may drop out of college, a result of unidentified needs. The amount of available cultural capital affects the capacity for familial encouragement and support, which can influence FG student success, particularly for struggling FG students.

Since FG college students' parents often have lower education and income than college peers, (LI)FG students can enter college with less social, cultural, and financial capital than non-FG students. The lack of social capital not only puts them at a disadvantage in regards to their peers, but most importantly it can negatively affect other salient factors (self-efficacy, academic engagement, and advanced educational awareness). These factors influence their inability to interact with faculty in and outside of the classroom (Soria and Stebleton 2012). LIFG students may not know that seeking out faculty or other academic resources is both normal and necessary. That lack of interaction with faculty in turn affects their knowledge of advance degrees that might suit their abilities. The lack of social, cultural, and financial capital can be exacerbated by the foreign feeling and the associated emotional challenges that come with it. Some FG college students feel that they often "straddle two cultures" (home and college), a bifurcation that widens if they are ethnic minorities in predominantly

White colleges (Harvey and Housel 2011). Furthermore, low financial aid knowledge and inadequate advising and support from faculty and staff can negatively impact FG college student's academic success, especially if they have to juggle between school and significant work commitments. Therefore, the factors above should not be viewed in isolation but as part of a web of potential intersections.

An analysis of the barriers reveals that some important gaps or missing concepts have emerged in this literature review. First, the literature only glossed over or in many cases avoided altogether the fact that many LI and some FG students have to work to survive. That means that one of the common barriers for many LIFG students is that most do not have the luxury to focus exclusively on college but also have to work. This reality limits the time they can dedicate to homework and to the resume- and network-building activities like clubs, sports, etc. (an issue we tried to emphasize in Scenario 2).

Another missing concept centers on the assumption that LIFG students go from high school directly to college after having useful pre-collegiate experiences that help build one or more of the capitals. When faculty or staff focus on this pipeline model, they assume that students go straight through their education, without having significant work experiences, raising families, and more. More understanding needs to be carved out for non-traditional paths to and through college.

In addition to these two gaps, another appears. So much of the literature is about helping LIFG students assimilate to college life, yet rarely do researchers raise the question of whether LIFG students are being asked to assimilate into an unjust/discriminatory educational system. For instance, a lack of courses offered at night is a barrier facing students who are working, raising families, etc. while going to college, as is the rising cost of tuition. Might the system itself need transformation? That the system was built originally for non-LIFG students is clear, but we no longer live in an age in which college students are as homogeneous as before WWII. In fact, it is students' very heterogeneity that is an unexamined strength. What would universities need to do to not alienate LIFG students in the first place, so that students didn't have to look elsewhere to seek out capital-building support? What if being welcoming and supportive of LIFG students was engrained into the actual *institutional culture*, without needing Band-Aids and add-ons to make it work for such students?

Additionally, the literature focuses too much on what students services can do but not enough on what faculty can do. Generally, student services staff understand the needs of LIFG students or are at least open to helping them build diverse forms of capital. Although faculty do understand that there are diverse learners in their classrooms, they may be missing the fact that LIFG students may bring *funds of knowledge* that other students lack—resiliency, ingenuity, resourceful use of materials, and multiple other problem-solving capabilities. By describing the "barriers" to student success, we may be focusing on deficits when a more productive strategy would be to focus on capacities and knowledge that LIFG students bring to the classroom. Although the barriers matter and should

not be ignored, might we be missing a significant learning resource here? If so, what guidelines might help faculty harness the potential, innovative and problem-solving capacities of LIFG students? Besides encouraging students to come to office hours and interact with faculty in other ways, what role do faculty and the actual content of what gets taught play in creating a supportive learning, belonging-centered, capital-building context? How might faculty improve teaching and learning for LIFG students—and in the process, for all students? Finally, the literature review commonly assumes a four-year university context, with robust residence life and student life programs that facilitate belonging and capital building. However, as Rolston and Cox have noted, many LIFG students begin their post-secondary education in two-year community colleges (2015). Although such settings generally have sports and clubs, the resources devoted to those may be more limited, and such colleges may have no on-campus residences and no residence life programs. So a significant gap in the literature can be phrased as a question: Given available constraints and resources, how do faculty and staff at two-year institutions foster belonging certainty and create opportunities for LIFG students to enhance the four capitals?

III. Best Practices and Solutions

The best practices and solutions described in this section correspond with barriers and intersections of barriers described in the two sections above. Those barriers raise important questions: If LIFG students experience belonging uncertainty—and it is important to realize that sometimes they will not—how do they move toward increasingly expanded levels of *belonging certainty*? That is, how can they, if applicable, eradicate the foreign feeling? If they lack certain forms of the four capitals, by what processes do they attain them? How can they make the new culture more and more familiar without excessive threat to a sense of identity rooted in their home culture? Figure 2 shows pathways to a foundation of four bolstered capitals and belonging certainty.

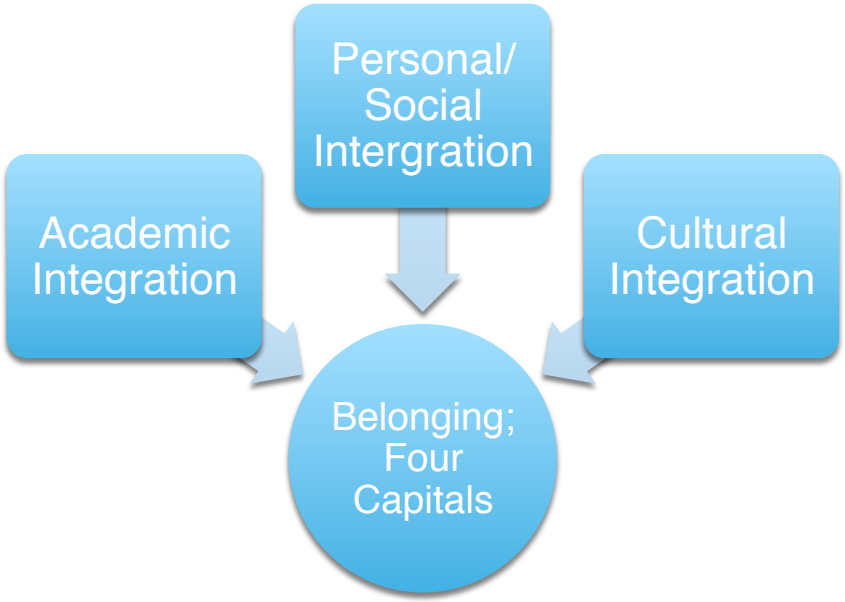

Figure 2: Forms of Integration Needed for Belonging Certainty and Four Capitals

Certainly, one of the least effective approaches to answering the challenges of belonging certainty and capital building would be to make sweeping generalizations about LIFG students. If a university has 500 LIFG students, it should not think of the questions above in terms of N = 500. The sample size, instead, should be n = 1. Although there may be some similarities among LIFG students, each student will likely answer those questions differently, as what constitutes belonging, attainment of any of the four capitals, or assimilation/integration will vary for each student. Getting to know each student's needs is an immense challenge, but one more likely to happen if taken as a campus-wide responsibility and informed by the guidelines below.

Experienced faculty and student services staff know that students will answer questions—particularly those about how they are doing in college—fully and more honestly when a given faculty or staff member has earned their trust. That trust should not be assumed, but earned. Also, we need to listen carefully to the realities of each student's own lived experience as they explore questions such as

- What has your experience been like so far in college?
- What experiences have helped you build a stronger sense of belonging here? What future experiences would help you increase that sense of belonging?
- What experiences have helped you build a stronger sense of the four capitals here? What future experiences would help you bolster those capitals?

One solution proposed by Ward et al. (2012) is to boost academic, personal/social, and cultural integration in order to make (LI)FG students successful. To do so, Ward et al. argue that various universities nationwide have implemented programs that deal with both academic engagement and social integration at the same time. The aim is to bring together faculty and students in a place where they can both share aspirations and cultural (and other forms of) capital. Ward et al. (2012) provide five actual programmatic examples.

The first one is the Partners for Success program implemented by California State University. This program is designed to address academic, personal, social, and career issues by matching faculty and staff with (LI)FG students. Second, the FIRST program at Clemson University, in contrast with the Partners for Success program, focuses on STEM FG students with the aim of providing better guidance toward a desired future career. STEM students are directly enrolled in this program once they are accepted at the institution, with strong university engagement (http://www.clemson.edu/academics/programs/first/index.html). The third example is the First Scholars program at Southern Illinois University. This program may be the most well designed to tackle the problem faced by FG students because it addresses financial, academic, and social issues. The program achieves the above by providing scholarships and other capital-oriented resources to students. Scholarships are tied to an educational program designed to enhance and facilitate the learning process of FG students. Furthermore, FG students are encouraged to talk to former FG alumni through the school's

network. The First Scholars program aims at long-term solutions by asking present FG students to become peer mentors to new FG students.

The Story Project at Syracuse University addresses the needs of FG students with awareness of their existence and shared experience between them to increase multiple forms of capital, create social integration, and further academic engagement. This program uniquely focuses on trying to lower the gap between expectations and reality through the creative use of web-based and other forms of narrative (http://newtosu.syr.edu/first-generation/Story%20Project.html). Finally, Town University sponsors several related programs that support FG students based on criteria such as low income and minority students. These programs strongly encourage faculty to participate, but also raise awareness by exposing these students to other services and departments on campus. The program's intent is to have the whole institution working toward the success of FG students to bolster a sense of belonging, social capital, and cultural assimilation.

It is worth noting that what constitutes a sense of belonging and integration overlaps yet is distinct. Both involve decreased belonging uncertainty and an increased sense that (LI)FG students belong on campus—academically, socially, and otherwise. However, cultural integration also involves a deliberate reflection and interface between aspects of a given student's identity related to his or her home and university cultures, resulting in a more harmonious co-existence of the two cultures—or at least a functional co-existence. Successful programs have students who look around their campus and think, "I belong here." What may be less clear is whether that belonging comes at the cost of a sense of belonging in one's home culture. A period of questioning one's home culture and campus culture's values is normal, expected, and can involve productive clashes that ultimately—if one perseveres—can make a person more capable of communicating in both cultural contexts.

In a sense what Ward et al. (2012) are proposing in showcasing the five programmatic examples is a joint venture between the institution and FG students. The success of (LI)FG students should be everyone's concern on campus. However, these practices generally live within the student services side of higher education. That strongly suggests the need for more faculty involvement in supporting LIFG students. Since literature on ideal faculty roles is comparatively sparse, faculty stand to make a contribution by disseminating any emerging best practices in working with LIFG students. Also, since student services are frequently engaged in addressing LIFG "barriers," a sole focus on student services can implicitly reify a deficit approach centered on what LIFG students lack and/or need. By contrast, faculty stand to make a significant contribution in working toward a belonging-centered, capital-building, funds of knowledge approach. Without making assumptions about all LIFG students, we need to explore what forms of instruction can elicit LIFG students' potentially innovative, resourceful, and/or unique approaches to problem solving, approaches that may be useful for individual, pair-share, small-group, and whole-class problem solving activities. This remains an under-researched, largely unexamined pedagogical area for exploration.

In chapter 5, Ward et al. advocate *institutional cultural changes* as a solution to help (LI)FG students. On most fronts, (LI)FG students should be treated similarly to any other student: creating an environment that will help them feel welcome, create opportunities to belong, build various forms of capital, and more. Ward et al. emphasize institutional changes to move in that direction, including training faculty and staff to better understand FG students (2012). However, in doing so, each institution should have a clear vision of what they are trying to achieve when it comes to (LI)FG students. Campus leadership can help FG students. Indeed, Ward et al. argue that institutions must set and create policies, involve everybody from the top-down, and have a long-term plan. Of those three steps to be taken by leadership, Ward et al. emphasized planning. Planning will help universities think through how to adapt an institution's culture, philosophy, and structure to meet (LI)FG student needs, and perhaps in the process benefit all students. Planning is an important step that institutions must take because of the nature of students in higher education but to also to remain a step ahead of the competition.

Social Cognitive Career Theory (SCCT) serves as a useful guideline to situate literature on FG students, particularly in engineering:

> Social Cognitive Career Theory (SCCT) brings together social cognitive theory and career development theory to explain career interests, choices, and performance, and it has been well-studied and applied within math and science professions (Lent, Brown, & Hackett, 1994). Simplified, SCCT states that personal background and traits (e.g., self-efficacy and outcome expectations) influence interests, which then influence personal goals and actions (Lent & Brown, 2006). In their study of gender, ethnicity, and SCCT variables predicting engineers' academic achievement, Hackett, Betz, Casas, and Rocha-Singh (1992) found strong correlations between personal traits including self-efficacy, outcome expectations, and personal interests. Others have extended the use of this theory to understand women's choices around persistence in the engineering workplace (Fouad & Singh, 2011). (X & Y, 2015, JEE, forthcoming).

Given the structure of SCCT, in the context of FG students, salient questions emerge:

- What personal background and traits matter?
- How do they shape career interests?
- How do those shape goals and actions and ultimately, personal and professional satisfaction?

Answering those questions will not be uniform for FG students, so we need a broader, more flexible, more encompassing model to understand the heterogeneous nature of FG students' paths through academia to their careers.

Although not focused exclusively on FG engineering students, some research on engineering students has identified similar traits that contribute significantly to successful completion in engineering education programs:

> Matusovich, Streveler and Miller (2010) found that alignment with sense of self ("attainment value") was the most important indicator for persistence. McGrath et al. (2013) similarly studied persistence in freshmen engineering students and found that enjoyment value ("intrinsic interest") was the most influential value for persistence (X & Y, 2015, JEE, forthcoming).

Clearly, interests, belonging and integration work on academic, social, psychological, and other levels, and differ for each student. Given the lack of a silver bullet, solutions should be integrated with a powerful feedback loop on what works—and why.

What frameworks can guide faculty as they promote LIFG student success in STEM? A useful framework, used in relation to a study of over 1,300 first-year engineering students, accentuates four mechanisms for building STEM self-efficacy (Hutchison, Follman, Sumpter, & Bodner, 2006). Students' beliefs about their own self-efficacy help explain why, for instance, two student groups with the same grades can verge, with one group remaining in STEM and the other dropping out—not due to a desire to change major but to perceived self-efficacy issues. The discussion below draws from Bandura's work on social cognitive theory (Bandura, 1997) and from Elizabeth Cox and colleagues' discussion of the four mechanisms (NSF Proposal, 2014).

The first mechanism—***mastery of experience—***encourages students to survey their own background, experiences, and personal character as potential assets to STEM. The point is to re-frame the question from, for example, *What does it take to be a good engineer?* to *What assets do I bring to engineering?* After acknowledging the need for math and science skills and knowledge in STEM, students can be challenged to imagine other categories, such as characteristics of perseverance, resourcefulness, and curiosity, and begin to recognize those qualities in their personal character that can help them in STEM classes. Reflections on their background and experiences, whether in the military, a trade, or construction job, can help them understand how such experiences can contribute to an engineering career. The goal of these exercises is to demonstrate to LIFG students that they have the *potential* for mastery of experience, and enable them to assess on their own terms what they need to fully master becoming an engineer, scientist, etc.

To develop the second mechanism—***social modeling—***students should be exposed to LIFG role models in STEM and challenged not to view them solely as heroes but rather to examine, *How did the role model arrive at their success?* What can be learned, for example, from the life story of Maria das Graças Silva Foster, an engineer and the former CEO of Petrobras, who came out of one of Brazil's poorest neighborhoods? For current students, how might LIFG alumni from community and four-year colleges serve as critical role models as people

who have walked a similar path and built sources of accessible capital? Inviting such LIFG alumni to STEM classes or to campus might take valuable time away from content or limited free time, but could also have significant benefits.

The third mechanism—***social persuasion—***empowers students to turn peer groups into a critical feature of their education, via multiple potential strategies. For instance, LIFG students from community and four-year colleges could share nontraditional strategies on how to study and use campus resources, such as how to find faculty evaluations in the library or identify proactive advisors. To facilitate students' socialization with a supportive peer/study group, students could share schedules and build in time for study groups and club activities.

Finally, by developing an awareness that they have knowledge or experience appropriate for engineering, through the development of their ability to engage role models, and by socializing with supportive peers, the fourth element—***psychological response—***moves from an orientation of doubt and hesitation to positive beliefs about ability to succeed in STEM (Hutchison et al., 2006). These four interlocking mechanisms are focused enough to serve as guidelines for fostering LIFG student success yet flexible enough to be enacted in diversely.

Focal Questions

Using the knowledge in this review, faculty can promote LIFG student success by exploring these focal questions:

- Given my philosophy of teaching and the way I approach students and learning, what in my current toolbox of pedagogical approaches is likely promoting LIFG students' success in my classrooms and beyond?
- Similarly, what might I change or add to my toolbox of pedagogical approaches to further promote LIFG (and perhaps all) students' success in my classrooms (and whenever feasible, beyond)?
- Of all the suggested ideas in the above literature review, which ones—given the realities of my workload—might I use and/or adapt to help me create the best learning atmosphere for LIFG (and by extension, all) students?
- What formative and summative assessment strategies can help me better understand how well LIFG and all other students are doing in my classroom? When I put these strategies on a spectrum from easy to complex‡, which assessment strategies seem most realistic given my workload realities?

‡ For instance, easy assessment strategies may include contrasting Fall 2014 with Fall 2015 relevant evidence of engagement that you already collect, such as attendance, participation, submission of required work, and grades; more complex assessment may involve assessing students' level of academic engagement in factors such as the nature of their involvement in the learning environment and participation in extracurricular learning opportunities.

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Comparison Chart: Three Different Kinds of Students

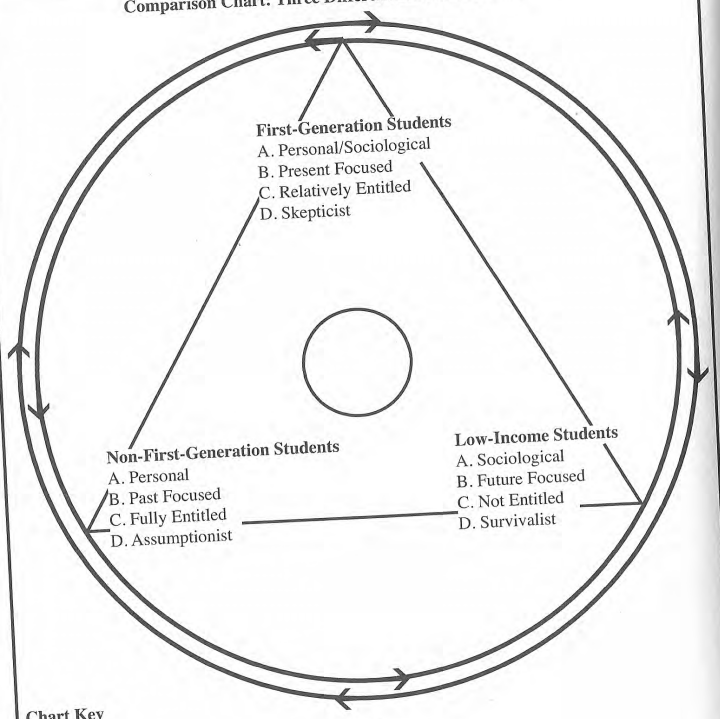

Chart Key

Dimension A: Existential Question About College Attendance

First-Generation Students. Hybrid *personal/sociological* answer to the existential question about college attendance, according to sociologists Richard Ochberg and William Comeau's theory of important life decision making. (The existential question is, "Why are you going to college . . . why do you want to be a college student?")

Non-First-Generation Students. *Personal* answer to the existential question about college attendance, according to Ochberg and Comeau's theory of important life decision making.

Low-Income Students. *Sociological* answer to the existential question about college attendance, according to Ochberg and Comeau's theory of important life decision making.

Chart Key continued on next page.

Chart Key (continued from previous page)

Dimension B: Temporal Orientation to College Attendance

First-Generation Students. Temporal orientation relative to college attendance that is *present focused*. When first-generation students ponder the idea of college attendance, the general purposes and goals of college attendance, they think about it in terms of what is happening during the current semester, what is going on in the present.

Non-First-Generation Students. Temporal orientation relative to college attendance that is *past focused*. When non-first-generation students ponder the idea of college attendance, the general purposes and goals of college attendance, they think about it in terms of what they have grown up understanding about it, what they have heard in the past from family members and friends.

Low-Income Students. Temporal orientation relative to college attendance that is *future focused*. When low-income students ponder the idea of college attendance, the general purposes and goals of college attendance, they think about it in terms of what it is going to provide for them in the future after attendance is over, after they get the degree.

Dimension C: Level of Entitlement

First-Generation Students. Feel that they are *relatively entitled* to a college education. They tend to believe that they are entitled to a college education relative to the effort they have put into preparing themselves for a college education.

Non-First-Generation Students. Feel that they are *fully entitled* to a college education. They believe they are entitled to a college education whether or not they have prepared themselves for one.

Low-Income Students. Feel that they are *not entitled* to a college education.

Dimension D: Attitude Toward Developing a College-Student Identity

First-Generation Students. *Skepticist* attitude toward developing a college-student identity. First-generation students are skeptical they will be absent a natural stage in life development if they don't attend college. They don't assume they will be different people when they finish college. They are not closed off to the possibility they will be different people when they finish college, but they are more likely to think they will be the same people they were at the start of college after they have finished college. In other words, they are more likely to think they will be the same people, only now with a college degree.

Non-First-Generation Students. *Assumptionist* attitude toward developing a college-student identity. Non-first-generation students figure attending college in their imagination as a natural stage in life development. In other words, not only do they assume they are going to college, they assume they will be different people when they finish college.

Low-Income Students. *Survivalist* attitude toward developing a college-student identity. Low-income students see college as a matter of survival, as a means of making the money necessary to elevate themselves out of a life of poverty. They don't associate attending college with identity development. In a sense, they defer identity development to that time in the future when they have their degrees and can begin making money.