Assessing Barriers to Participation in High-Impact Practices among STEM majors

by

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A dissertation submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Doctor of Philosophy

Auburn, Alabama
December 14, 2024

Keywords: High impact educational practices, equity, underrepresented student groups, case study, barriers to participation, engineering education

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Abstract

This study sought to improve understanding of the impacts of high-impact educational practices on underrepresented or underserved student groups in STEM majors. The participants in this study were undergraduate students, faculty, and administrators at a large, public university located in the southern United States. This study utilized an explanatory sequential mixed-methods design. The first phase was a quantitative analysis of existing databases using descriptive statistics and correlational relationships to examine differences in HIP participation rates among STEM majors. The second phase was a qualitative analysis that used a collective case study method to explore the barriers encountered by various student groups when participating in HIPs. The qualitative portion also aimed to make meaning of the value and context that HIPs provided to student groups.

It was concluded that students participate in HIPs at the university at significantly different rates, in particular underrepresented students and male students. Barriers to participation identified by underrepresented students interviewed included financial, time, navigational, and cultural/social barriers. Students and administrators interviewed in this study provided context for how different student groups perceive value of HIP participation, and how certain aspects of HIP administration can also be a barrier to involvement.

Based on these findings, recommendations to improve access to HIPs for all student groups included, but are not limited to, financial assistance for direct HIP participation, shortened time requirements, improvements in how HIPs are marketed to students, audits of HIPs for equity issues, and the education of HIP administrators on the outcomes that underrepresented student groups are expecting from a high quality HIP experience.

Acknowledgments

The author would like to acknowledge the support of Dr. Christine Schnittka, who has helped guide me through this process with patience, optimism, and wisdom – thank you!. Thank you also to Dr. Chris Clemons, Dr. Jordan Harshman, and Dr. Oladiran Fasina for serving on my committee. A special thanks to Dr. Fasina for encouraging me to pursue a doctorate and for supporting my journey not only as a committee member, but as a mentor and advisor as well.

Thank you to my wife, Dallas Davis, who supported me throughout this endeavor with unfailing encouragement and patience – I love you and could not have done this without you. Thank you to my two sons, Charlie and Chase, who gave up some of their family time with me so I could attend classes, study, and write numerous hours in the evenings and weekends. I would not be here without the three of you and your love and support.

Thank you as well to my mother and father, Anne and David Davis, who raised me and always emphasized the importance of education. A special thanks to family members who also encouraged me along the way: my brother and his family, Jeff, Amy, and Sumner Davis, and my in-laws, Karry and Denise Chambers, Mark and Debra Ballard, and Kennon, Kristie, and Will Chambers. Thanks to everyone who helped, encouraged, and supported me throughout this journey.

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List of Abbreviations

AACU	Association of American Colleges and Universities
HBCU	Historically Black Colleges & Universities
HIP	High Impact Practice
NSSE	National Survey of Student Engagement
STEM	Science, Technology, Engineering, and Math

CHAPTER 1: THE PROBLEM

High-impact educational practices (HIP) are a set of teaching methods that have been shown through research to improve learning outcomes in a wide range of students. Many of these practices were well defined, widely acknowledged, and demonstrated through research to improve student learning and retention well before they were grouped together and associated as "high impact." Assessment of the impact of these practices and providing a standard criterion by which to assess that impact was one of the driving factors behind George Kuh's seminal 2008 study *High Impact Educational Practices: What they are, why they matter, and who has access to them*. Along with researching how to assess HIPs, Kuh noted that there is differential access (participation) among various groups of students but that participation improved learning and outcomes for students regardless of group association. In the introduction to George Kuh's study on high-impact educational practices published by the Association of American Colleges and Universities (AAC&U), Carol Geary Schneider, the President of the AAC&U at the time, stated that with regards to participation in high-impact educational practices "…many subsets of college students are still waiting in line for full inclusion." (Kuh, 2008, p. 12) Despite nearly 15 years of research and assessment of HIPs at colleges and universities across the United States and beyond, Carol Schneider's quote still rings true. In 2013, authors Ashley Finley and Tia McNair found that participation in HIPs among underserved student groups (in this case, African American/Black, Hispanic, and Asian American students) still lagged behind White/Caucasian students (Finley & McNair, 2013). Several terms are applied to these groups: Kuh used the term "underserved", as did Finley and McNair, others have used the term "underrepresented." "Underrepresented" is used to describe students considered to be in the population minority

overall, but also in the population minority at their respective institutions. “Underserved” describes students who face challenges accessing resources in educational systems not originally designed to serve them. This may include students of color, first-generation students, students from low-income backgrounds, transfer students, and students who are underrepresented at their institution demographically (Rendon, 2006). As recently as 2021, the National Survey of Student Engagement (NSSE) showed that Hispanic and African American students who were seniors, participated in two or more HIPs at a rate of 10 percentage points less than their White/Caucasian counterparts (NSSE, 2021). From fall of 2010 to 2023, the enrollment of Black / African American students in colleges in the U.S. declined 23%. In 2020, underserved student groups had a graduation rate of 45% from 4-year institutions, whereas the national average was 64% for all students. (NCES, 2023). Kuh, along with Finley and McNair, have shown that participation by underserved student groups improves outcomes such as graduation rates, GPA, deep learning, and retention.

To understand why these gaps exist, and how to close them, HIP researchers must, as Jillian Kinzie (2021) implored in a recent article entitled “Centering Racially Minoritized Student Voices in High Impact Practices”, “…spotlight the experience of racially minoritized students to inform the advancement of the HIP movement” (p. 2). We must consider the perspective of the student when researching barriers to participation and the forms of capital that these students consider important (Yosso, 2005). In their discussion on the theory of community cultural wealth, Yosso examines the concept that different cultural communities value different things and looks at how researchers often fall into a trap of ‘race neutral’ research and fail to consider the cultural values (wealth) of the community being researched. Yosso uses Critical Race Theory, an offshoot of Critical Theory, as the framework for challenging deficit-minded

research approaches and supports the idea that communities can provide students with different forms of cultural 'capital' beyond those typically expected in predominantly White communities. Yosso emphasizes that is important to try and recognize and understand the different forms of capital and cultural wealth that exist among communities when researching educational practices and how those forms of capital impact students from varying backgrounds. Yosso describes six forms of capital that contribute to community cultural wealth, and these forms often overlap and intertwine: aspirational, familial, social, linguistic, resistant, and navigational (Yosso, 2005). Along with Yosso's theory, Kuh's 2013 study "Ensuring Quality & Taking High-Impact Practices to Scale" provides a conceptual framework for this study. Kuh focuses on eight quality factors of high impact practices (see Table 2) but also implores researchers to focus on the "structural and programmatic characteristics of HIPs in terms of inducing student effort and other desirable outcomes." Keeping in mind Yosso's theory on cultural capital wealth but also turning an eye towards the structure and administration of HIPs, this study seeks to examine gaps in participation and outcomes of communities of underserved students at "Plaindale" University, a large, public university in the southeastern United States. "Plaindale" was used as a pseudonym in place of the real name of the university in this study to maintain anonymity. In Finley and McNair's 2013 study, the question was asked "What factors do underserved students identify as barriers or obstacles to their participation in high-impact learning experiences?" This is a key question of this study as well; however, we recognize that in the same paper, Finley and McNair (2013) suggest that national-level data sets are "…too far removed from the nuances of campus life and policy…" (p. 29). This research seeks to examine these barriers through a lens of the local structure and administration, the previously defined quality factors of high impact practices, while acknowledging that many underserved cultural communities on campuses have their

specific forms of community cultural wealth that will undoubtedly affect the types of expected barriers, outcomes, and quality values that these communities relate to participation in high impact educational practices.

Problem Statement

Differences in rates of participation in HIPs continue to persist among groups of students at higher education institutions across the United States. The benefits of participation in HIPs, particularly among underserved student groups, are well documented, therefore increasing participation in HIPs among students becomes important. The reasons why some groups of students participate in HIPs at higher rates than others continue to require study.

This study is set at a large, public university in the southeastern United States. The time frame of the study is situated after the COVID-19 pandemic, and during a political climate where issues of diversity, equity, and inclusion have become highly politicized by elected officials. This study seeks to help identify barriers to participation among groups of students at "Plaindale." By identifying existing barriers, the hope is to offer solutions for removing, overcoming, or adapting barriers to help all groups of students access HIPs at higher rates.

HIP participation is often identified by universities using a variety of methods, from large national-level surveys, such as the NSSE, to data collected by their own administration among students or alumni. While many universities readily identify the rates of HIP participation at their institutions and acknowledge differences in the rates of participation among various groups of students, the reasons for those differences in rates of participation are often not acknowledged or studied.

Understanding the ways in which students access or choose to participate in HIPs becomes relevant for helping higher education administrators tackle issues of equity and

inclusion at their respective institutions. Not only does improving rates of participation in HIPs among student groups help improve outcomes for those students (Kuh, 2008) but can help us understand the motivations and issues that surround how different groups of students navigate and access all sorts of educational opportunities. If we can better understand these motivations, means of navigation, and barriers for student groups, we can improve learning outcomes, placement outcomes, and help create more welcoming, diverse student bodies.

Purpose of the Study

This study seeks to improve understanding of the impacts of high-impact educational practices on underrepresented or underserved student groups in STEM majors. It also seeks to understand ways in which the administration and assessment of HIPs can be improved so that they better serve all students. This study seeks to continue research into HIP quality, HIP participation, and HIP structural administration and programming with respect towards underserved student groups.

Research Questions

- Are there significant statistical relationships in terms of participation in HIPs among various groups within STEM majors at "Plaindale" University?
- What types of barriers to HIP participation can be self-identified by underserved student groups (and individuals) within STEM majors, specific to "Plaindale" University?
- What do HIP experiences mean to underserved students in the context of their lives, educational experience, and ability to obtain a degree?

Overview of the Research Design

To answer the research questions posed above, the study used a mixed methods approach. The mixed methods design followed an explanatory sequential pattern whereby the quantitative

analysis was performed first, then a qualitative follow-up phase was used to explain results (Mertler, 2019). Utilizing the data sets available, the first question was researched using quantitative statistical analysis. The second and third questions were analyzed using qualitative methods, in particular a case study methodology. The exact statistical method used was determined during the analysis; please see Chapter 4 for additional details. The exact case study method was also determined following the statistical analysis results, and at the beginning of the data collection phase of the qualitative portion of the study. This was done to allow some flexibility in the exact qualitative methods selected (Creswell & Poth, 2018). It was important to select a research design that would potentially provide direct answers to all the posed research questions. While certain details of the research methods were changed during the study, the overall research design remained constant, while also allowing for some flexibility to adjust methodologies during the course of the study to adapt to unforeseen changes and results.

Assumptions and Limitations

The scope of this study was limited to a group of participants at a single university and findings may not be generalizable to places or people without a similar culture, history, and context. The data sets used in this study presented some limitations in that they did not include more expansive definitions of underserved students in terms of race, gender, or sexual orientation.

Assumptions made in this study were as follows:

1. All student participants were enrolled at the university during the study.
2. Faculty and staff interviewed were aware of the general definitions of high impact educational practices.
3. All interviewees answered truthfully.

4. Data collected in surveys previously designed and tested for reliability and validity were, for the most part, reliable and valid.

Summary

This study proposed to investigate specific barriers to participation in high impact educational practices among a local group of students at a single university. In seeking these answers, this study hoped to provide additional context on the reasons various groups of students, in particular underserved students, face barriers, what those barriers are, and what might be done to reduce or eliminate some of the identified barriers. In order to understand the context of those barriers from the student's perspective, this study used a case study methodology (along with a quantitative analysis of participation rates) to help tell the stories of those students in their own voice. Participation in HIPs by all students has been demonstrated to be beneficial to not only students, but also their peers, future employers, and educators alike. This research hopes to add to the ongoing discussion about how higher education can continue to improve access, equity, and the quality of high impact educational practices.

CHAPTER 2: REVIEW OF THE LITERATURE

In 2005 the American Association of Colleges and Universities (AAC&U) launched their Liberal Education and America's Promise (LEAP) initiative with a core goal of updating and improving learning outcomes for college students. As the number of high school graduates increased across the United States, and more and more of them were wanting to attend college, LEAP also recognized a need to make college more accessible to these students. (U.S. Department of Education, 2006). LEAP took a three-pronged approach to achieving this goal, by focusing on educational research, public advocacy, and action on campuses. By integrating the different levels of stakeholders, LEAP intended to help establish frameworks that incorporated the most current research, students, and the faculty and administrators who could implement change effectively (College Learning for the New Global Century, 2007). LEAP intended to help update college curriculums from the traditional "core" curriculum model to a model more suited for modern times and the more diverse student population. "Without a serious national effort to recalibrate college learning to the needs of the new global century, however, too few of these students will reap the full benefits of college" (AAC&U, 2007). Through LEAP, the AAC&U published several works on addressing these three areas and made the case that American college students needed a change in how they were being taught and assessed to meet a new set of global challenges. These include "Liberal Education Outcomes: A Preliminary Report on Student Achievement in College" (AAC&U, 2005), "Communicating Commitment to Liberal Education: A Self-Study Guide for Institutions" (AAC&U, 2006), "Making the Case for Liberal Education: Responding to Challenges*"* (AAC&U, 2006), "College Learning for the New Global Century" (AAC&U, 2007), and "Assessment in Cycles of

Improvement: Faculty Designs for Essential Learning Outcomes" (AAC&U, 2007) (as listed in Kuh, 2008). Global challenges faced by students included cross-cultural interactions, learning across disciplines, working in teams, communication outside of a specialty, and technological innovation. At the time, LEAP also placed an emphasis on addressing these global challenges with respect to historically underserved or underserved student groups. Kuh (2008) recognized through analyzing NSSE datasets that underserved student groups lagged behind others in terms of achievement, outcomes, and participation in what have since become termed "high impact educational practices" also known as HIPs.

Kuh's high impact practices

Included in this set of publications was a paper by George Kuh entitled "High-Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter" (AAC&U, 2008). Kuh identified eight "high impact" practices already being used by educators across the country that were proven to be highly effective at producing the sort of learning outcomes identified by LEAP as essential to improving outcomes and preparing college students for work in the 21st century. These "essential" learning outcomes included outcomes that address practical skills, cultural and historical knowledge, information literacy, ethics, civic engagement, applied learning, and lifelong learning, among others. (Kuh, 2008). Kuh acknowledges most HIPs were created and evolved prior to his landmark study, he also notes that an extensive body of research had already been conducted on the effectiveness of these types of educational practices (see note 10, page 32 of Kuh, 2008). Kuh's research focused on the effectiveness of these HIPs at improving student learning and was one of the first that relied on a large, national-level data set.

In 2008, as suggested by Carol Schneider in her introduction in "High-Impact Practices", and according to research done by Hart Research Associates in 2006 on behalf of the AAC&U, few employers considered the graduates they were hiring at the time to be meeting these LEAP essential learning outcomes. "While the majority of those surveyed view college graduates as ready for entry-level jobs, employers report that many graduates lack the skills they need to be promoted" (Kuh, 2008, p. 16). To meet the challenge of educating 21st century graduates, Schneider suggested that the high-impact practices identified by Kuh act as a "pathway" to help educators and students meet essential learning outcomes desired by employers (Kuh, 2008).

So, what is considered a "high impact" educational practice? Although Kuh is widely credited as coining the phrase and defining the initial eight HIPs, the practices themselves had been around and were being used across college campuses well before their formal "definition." For example, thousands of papers on the impact of undergraduate research were written before 2008 (Lenning & Ebbers 1999; Tinto 1995;). A recent online search revealed that nearly 3,000 articles on the impact of undergraduate research had been published in peer reviewed journals between 2000 and 2007. Kuh provides his original five HIP definitions in the 2008 publication (Kuh, 2008) as Definitions for First Year Seminars, Learning Communities, Service Learning, Undergraduate Research, and Capstone Courses. Additional detailed definitions are provided in "Five High-Impact Practices: Research on Learning Outcomes, Completion, and Quality" by Brownwell and Swaner in 2010. E-portfolios were added as an additional HIP in 2016 (Watson, Kuh, & Rhodes, 2016). The table below represents a non-comprehensive list of educational practices considered to be "high impact":

Table 1

General Definitions of Selected High Impact Practices

High Impact Practice	General Definition
First-Year Seminars and Experiences	Programs that bring together groups of students who are in their first year of college to work together.
Common Learning Experiences	Sets of required courses that all students take. These often center on a basic requirement or theme.
Learning Communities	These take a variety of forms, but are an attempt to groups students, faculty, and others together around a common topic (i.e., writing)
Undergraduate Research	Research and programs that place undergraduates in positions to conduct and participate in faculty-led research.
Collaborative Learning / Projects	Courses, assignments, and opportunities to work as a group to solve problems.
Writing-Intensive Courses	Courses that feature writing throughout a curriculum. These are often spread over several courses and levels.
Community-Based Learning/ Service Learning	Working on problems within a community, often outside of the classroom. Students get to apply their learning to real-life problems.

High Impact Practice	General Definition
Internships / Co-op / Field Experience	Students work directly for a company or job full time or part time to gain actual work experience.
Capstone Courses/ Culminating Senior Experience	A final experience for seniors before graduation. These may take many forms, such as a large design project.
Global Learning / Study Abroad	Students attend school or experiences in a country other than their own or are working in a setting outside their normal culture.
E-portfolio programs	Electronic documentation of a student's learning and educational experience.

A Set of Practices

While research into the effectiveness of many of these practices had been conducted prior to Kuh's definition of HIPs, one could argue that by defining these practices as a "set" marked the creation of a whole branch of educational research into HIPs, their effectiveness, administration, and subsequent issues. Kuh's study was also notable for its use of the NSSE data to gauge the effectiveness of participation in multiple HIPs. The size of the NSSE database and longitudinal use provided Kuh with an almost unparalleled data set (at the time) from which to answer questions. In 2008 the NSSE survey sampled almost 1,100,000 freshmen and senior students across the country. The response rate was 31% for freshmen and 35% for seniors (Petersen, 2008). Subsequently, research into the effectiveness of HIPs increased following Kuh's report, however over time the researchers that had focused on HIPs and their effectiveness

began to also research what constitutes a "good" quality high impact practice (Kuh & O'Donnell, 2013).

"Good" High Impact Practices

This section describes what the literature says about what constitutes a "quality" high-impact practice, beginning with Kuh and O'Donnell's 2013 report on "Ensuring Quality & Taking High-Impact Practices to Scale" published by the AAC&U. Kuh and O'Donnell updated their 2008 study on HIP effectiveness, again using NSSE datasets and found that HIPs were still very effective at improving deep learning and student learning outcomes across all demographics. They also confirmed that students and colleges were not reaping the benefits of these practices because of relatively low participation rates in HIPs among students. Kuh wanted to understand what made some HIPs better quality than others, with an eye towards increasing participation rates. What Kuh and O'Donnell learned was that certain quality factors helped increase participation rates and overall effectiveness of HIPs. The eight quality factors as described by Kuh and O'Donnell are:

Table 2

Eight Conditions of a High-Quality HIP as Defined by Kuh (2013)

Quality Factor Description
Performance expectations set at appropriately high levels.
Significant investment of time and effort by students over an extended period
Interactions with faculty and peers about substantive matters
Experiences with diversity
Frequent, timely, and constructive feedback
Periodic, structured opportunities to reflect and integrate learning.
Opportunities to discover the relevance of learning through real-world applications.
Public demonstration of competence

Additional research has also used the same or similar conditions for investigating the quality of high impact educational practices. (Finley, 2019; Johnson & Stage, 2018; Kinzie et al., 2021; Springer et al., 2019; Zilvinskis, 2019). Kinzie (2021) and her team take a different approach to investigating HIP quality by using a more interview-style survey. The focus of the study is on HIP quality but also asking about the factors that may be specific to minorities as it relates to HIPs. The study concluded that by focusing on the experiences and voices of "racially minoritized" students HIPs could be improved in terms of equitable access and quality for underserved students. Finley (2019) provided a playbook for institutions to assess the quality and impact of their HIPs in a comprehensive manner while also considering equity. This included recommendations on how to directly assess HIP impacts as opposed to looking at them as a group or only their impact on the participants as a whole. Researchers and HIP administrators were encouraged to take a deeper look at equity gaps, quality of HIP delivery, and student learning. Springer et al. (2019) provided an overview of current (for the time) HIP assessment practices and encouraged institutions to continue to improve on their delivery of HIPs, improve their techniques for assessing the impact of HIPs, and move beyond only focusing on outcomes to assess HIPs for quality. While Johnson and Stage's 2018 study concluded that HIP participation did not increase graduation rates at public institutions, the study performed a quantitative analysis of a large number of institutions (101) and provided an extensive background and review of HIP assessment methods. Zilvinski's study (2019) was notable for relating three of the aspects of high-quality HIPs (effort, collaboration, and faculty interaction) to three desired outcomes (engagement, GPA, and satisfaction). Using the same NSSE data set that Kuh employed, he was able to show relationships between quality factors and desired outcomes.

What was notable in the context of this review was that he found that, for underserved student groups, those relationships did not hold true.

Improving Student Outcomes

Understanding the qualities that comprise an effective HIP is important, but what does the literature say about the effectiveness of HIPs at improving student outcomes? Kuh and others (as previously mentioned) initiated the claim that participation by students in HIPs improves learning outcomes, and then backed their claim up with quantitative analyses of data from NSSE surveys. Since Kuh defined HIPs and made the argument for their effectiveness in 2008, numerous other studies have examined the potential for HIP effectiveness using both quantitative and qualitative methodologies. Finley and McNair (2013) updated Kuh's argument for HIP effectiveness, with an eye towards the effect on underserved student groups. Like Kuh, Finley and McNair relied on NSSE data but admit "…these national data are too far removed from the nuances of campus life…" (p. 29) and outline a methodology specifically for campus HIP administrators and researchers to investigate HIPs on a local scale. Johnson and Stage (2018) provide an excellent summary of the research into HIP effectiveness (through 2018) for Freshman Seminars, Core Curriculum, Learning Communities, Writing Courses, Collaborative Assignments, Undergraduate Research, Study Abroad, Service Learning, Internships, and Capstone Courses/Projects. Kinzie and others (2020) took a newer approach to assessing HIP effectiveness, using a custom survey and the eight HIP quality measures as defined by Kuh (see Table 2). While Kinzie reached similar conclusions as to HIP effectiveness as previous studies, an acknowledgement was made that effectiveness studies needed to move beyond simple quality measures and participation rates and dig deeper into the issues of equity and access.

Assessing HIPs

The methods by which HIPs have been assessed have changed over time. While many studies used solely quantitative data gathered from self-reported data (An & Loes, 2022; Kuh, 2008; Miller et al., 2018; Rocconi, 2011; Zilvinskis, 2019) an acknowledgment that relying on national level data sets alone may not provide a clear picture of HIP effectiveness at a local level (Kuh, 2013). Ashley Finley's "A Comprehensive Approach to Assessment of High-Impact Practices" (AAC&U, 2019) provides an excellent overview of current HIP assessment methods and points out that "evidence of effect requires assessing more than outcomes, alone" (p. 3). Finley goes on to make the case that multiple sources of evidence are needed to actually assess HIPs, including student work, focus groups and interviews, and additional types of qualitative evidence. Both Finley, Kuh, and other researchers (Kinzie et al., 2021) have acknowledged and begun to implement a more comprehensive approach to assessing HIPs, including the use of both quantitative and qualitative methods. Finley and McNair's 2013 study provide researchers with a template for this approach, encouraging HIP researchers to use a mixed-methods approach. Several researchers have acknowledged that a quantitative method alone may not be able to fully assess the effectiveness of HIPs, noting that utilizing a variety of data sources will help shine a light on the issues of equitable access and varying outcomes for different groups of students (Finley, 2019; Kuh & McDonnell, 2013; Thorington et al., 2019). Finley (2019) advocated for a comprehensive approach to assessing HIPs, including using both direct (quantitative) data and indirect evidence, such as focus groups, local surveys, and course evaluations. Kuh & McDonnell (2013) advocated for a more advanced model for assessing and defining HIPs on campus, including identifying which groups of students benefited the most from participation in HIPs. Research has shown that outcomes vary for different student groups, in particular

underserved student groups often have varying rates of participation in HIPs as well as differential outcomes (Finley & McNair, 2013; Kuh & McDonnell, 2013; Thorington et al., 2019). Some research has also shown that there were not significant differences from a quantitative standpoint in outcomes or participation rates (An & Loes, 2022). In general, however, the majority of research into HIP effectiveness and participation rates acknowledges that the ways in which HIPs are administered can (and does) produce differential outcomes and can affect participation rates among underserved student groups.

Differential Outcomes

If we think of HIPs and their administration in terms of Yosso's theory of community cultural wealth (Yosso, 2008) and view HIPs through the conceptual framework laid out by Kuh and others, researchers can approach understanding barriers to participation and differential outcomes from the standpoint of not assuming that underserved students are responsible for overcoming any existing structural inequalities, also known as an "anti-deficit mindset" (Kinzie, 2021; Yosso, 2005). McNair, Kuh, and others have acknowledged the need of researchers to identify and address the barriers to participation in HIPs by underserved student groups. Kuh, even in 2008, stated that "the time has come for colleges and universities to make participating in high-impact activities a reality-and a priority-for every student" (p. 32). Despite evidence of the positive impacts on outcomes that engaging underserved student groups in HIPs has, and an acknowledgement by the higher education community that their schools are often not set up to provide equitable access to HIPs, only a relatively small amount of research into barriers to participation has been conducted.

Several researchers have already begun investigating HIP participation barriers, why they exist, and provide recommendations on how to remove or reduce them: Chama et al. (2018)

looked at perceived barriers of HBCU social work students into study abroad programs. This study relied on qualitative measures and found four main barriers: lack of institutional support, lack of funding, lack of support from faculty of color, and lack of family support. The study was successful at identifying the specific barriers for students at one particular school with one particular HIP, study abroad, and relied primarily on qualitative interview results. Perkins (2020) arrived at similar conclusions, in a study that also focused on participation in study abroad programs by students of color. The Perkins study focused on using an anti-deficit framework, concluding that research into HIP barriers should not only look at barriers to participation, but rather on "what enables students to rise above barriers." Similar to this study, Perkins incorporated Yosso's theory of cultural capital when analyzing the collected qualitative data. Perkins concluded that several factors would improve students of color rate of participation in a study abroad program, including cultural knowledge expansion, family support, financial support, opportunities to expand networks and learn new skills, along with experiencing something new. Grabsch et al. (2021) studied HIP participant alumni at one specific school and used qualitative, phenomenological methods, but a different theoretical framework than this proposal. While the focus of the Grabsch study was barriers, only a few underserved students were interviewed. This study reached some similar conclusions as other studies, where students (alumni in this case) identified barriers to participation such as financial, parental, peer or social pressure, and lack of available time. Kinzie et al. (2021) took a qualitative approach and spoke directly to underserved students who had participated in HIPs. While Kinzie did not specifically ask students about barriers to participation, they did ask about HIP qualities that underserved students are interested in, and how those differ from the previously mentioned quality indicators (see Table 2). This gives us an important insight into how underserved student groups view

HIPs, their quality of experience, and what some of the 'missing' elements may be. Kinzie mentions empowering experiences, independence, serving others, and a supporting community (p. 12) as some of the factors in their study that students mention as important or missing qualities they looked for in HIPs. Finley and McNair asked about barriers to participation directly as part of their 2013 study and student responses included: competing priorities/time restrictions, greater transparency, lack of guidance or advising (as related to HIPs) (pp. 27-30) as possible barriers to HIP participation. These answers came from focus group interviews. They acknowledged that "student voices are essential when examining what works to improve student success in higher education." They acknowledged, however, that national-level data sets might be too "far removed" from localized conditions of individual schools to truly identify barriers. Both the Kinzie study and the Finley & McNair study encourage additional research into both barriers to participation and HIP quality as it relates to underserved student groups.

Filling a gap in the literature

This proposal aims to fill some of the gaps in the current literature and research. Specifically, much of the research into HIP participation and quality focuses on large, multi-school data sets, relying solely on quantitative measures which, while providing excellent data, often miss the "voices of the participants" being studied (Creswell & Poth, 2018). In reviewing the available literature, it also became evident that additional attention needs to be given to students in STEM-related majors, such as engineering. Another gap in the research is studying HIPs at a local level, like the studies of Chama (2018) and Perkins (2020), which follow some of the suggestions for current HIP research put forth by Kuh, Finley, and others to focus on specific groups and situation the research at a more local level, accounting for location-specific culture and values. Finley and McNair's study from 2013 took a mixed-methods approach, and

specifically asked underserved student groups about barriers to participation, however this data and the conclusions drawn are now 10 years old, and many things about HIPs, their administration, assessment, and qualities have changed, along with the general landscape of higher education. No studies have (as of this writing) focused on the impact that the COVID-19 pandemic had on high-impact educational practices, their participation rates, or their quality.

Summary

Extensive research has been conducted into the definition of HIPs, what makes a high-quality HIP, how those HIPs are assessed, and the effectiveness of HIPs at impacting educational outcomes. Much of the literature and research surrounding HIPs focuses on specific practices and their effectiveness at improving educational outcomes. Early research relied on national-scale data sets such as the NSSE and looked at broad outcomes and overall effectiveness of HIPs. Subsequent research began to focus on smaller data sets, and often limited the scope to one to three HIPs. Much of the research into HIPs has been quantitative and modeled around Kuh's quality definitions of HIPs. Some qualitative studies have been completed recently, signaling a different direction in research into HIPs. Although Kuh and Finley & McNair have provided what amounts to research templates for investigating the effectiveness of HIPs on the outcomes of underserved student groups, relatively few studies have been conducted in this area. Fewer still have looked at the barriers to HIP participation from a qualitative or mixed-methods research methodology.

Conclusion

Based on a review of the existing literature, there is a need to continue research into HIP participation and barriers to participation, particularly among STEM majors and underserved student groups at 4-year colleges in the southern United States. Directions of future research

need to be directed towards a local scale, with local communities taking into account those communities' cultural capital and adding to the existing research about barriers to participation for underserved student groups.

CHAPTER 3: METHODS

Purpose

The purpose of this research study is to determine if a significant difference exists in HIP participation rates among student groups in STEM-related majors at "Plaindale" University and to investigate the causes, reasons, or attributes that may be contributing to lower participation (barriers) among various student groups. This study also seeks to give context and meaning to those reasons that may be specific to different majors, demographics, or gender.

Research Questions

1. Are there significant statistical differences in participation rates in HIPs among various groups of STEM-related majors at "Plaindale" University?
2. What types of barriers to HIP participation can be self-identified by underserved student groups (and individuals), specific to "Plaindale" University?
3. What do HIP experiences mean to underserved students in the context of their lives, educational experience, and ability to obtain a degree?

Methods

Approach and Rationale

A mixed-methods approach (Mertler, 2019) was taken with this study, using both quantitative analysis and qualitative, with the qualitative portion using a case study approach that focuses on the individual perspectives of underserved undergraduate students in STEM-related majors who have experienced barriers to access for high-impact practices. Case studies take a natural approach and can provide perspective within a specific context and setting (Stake, 1995). The quantitative portion examines the statistical differences or correlations in participation rates among various student groups. The researcher spoke with individuals who have participated (or attempted to) in high impact practices as part of an underserved student group, listened to their stories, and constructed a shared interpretation of those events to better understand the causes of barriers to participation in high-impact practices for this group. Interviews with faculty, staff, or university officials who participate in the administration of HIPs were also conducted. HIP administrators were asked to write independently about their experiences in working with students who participate in the HIPs they administer, and these writings were compared to student interview responses, the quantitative data, and HIP administrator interview responses.

Site and Sample Selection

The location of this study is on the campus of "Plaindale" University, a four-year institution located in the southeastern United States. At the time of this study, "Plaindale" University consisted of 79.1% White, 5.4% Non-resident Alien, 4.9% Black or African-American, 4.3% Hispanics of any race, 2.8% Two or more races, 2.8% Asian, 2.8% 2 or more races, 0.35% Race unknown, 0.28% American Indian or Alaska Native, and 0.06% Native

Hawaiian or Pacific Islander. Interviews took place on campus at a public place, not in a closed office or classroom. All interviewees were undergraduates and selected from STEM-related majors (i.e., engineering, mathematics, architecture, forestry) from the following selected colleges and schools within "Plaindale": College of Science and Mathematics (S&M), College of Engineering (E), School of Forestry and Wildlife Sciences (F&W), College of Architecture, Design, and Construction (A), and selected programs from the College of Agriculture (Ag). Because the research is primarily interested in underserved undergraduate STEM majors, the sample was not limited to only curriculua with primarily STEM related coursework.

At "Plaindale", underserved students include groups such as African Americans, Hispanic, Asian, Pacific Islander, and Native Americans. Students with any mix of these groups were included in the potential sample pool. Interviews with HIP practitioners came from the same schools and colleges as the students but will not be limited to ethnic makeup. Interviews with the 'majority' of students were also conducted to compare and contrast their stories with the other groups. The sample for interviews included 3 White (2 female, 1 male), 3 Asian or Pacific Islanders (2 female, 1 male), and 8 Black or African Americans (4 female, 4 male). Not all interviews were used as part of the study (see Chapter 4).

Researcher's Role & Positionality

In this study the role of the researcher was to identify any potential participants, interview participants, arrange meeting times and locations for interviews, record and collect data from interviews, and interpret the data. During interviews, the researcher asked questions, but primarily listened to responses and recorded them.

The researcher recognizes that he is a White male and that his worldview and perspective on this research will likely vary from some, if not many, of the target participants. The

researcher acknowledges that his presence and role at the university may have affected, or biased participants' answers provided to some questions. To help put participants at ease, the researcher ensured that no participants were active students in any classes he teaches. Anonymity was guaranteed for all participants, and participants were given the option of interviewing with an alternate researcher, if they chose.

Instrumentation

An interview protocol and script were used for all interviews with participants. Interview protocols and scripted questions are considered reliable and valid, as they have been previously used in published studies. The interview script and protocol were based on Finley and McNair's 2013 study. See Appendix 1 for script questions. Questions are broad and open-ended, to encourage narratives to emerge (Charmaz, 2006). A research journal was also kept by the researcher along with recordings of interviews. These recordings were kept electronically on a secure laptop and not stored on any cloud server. All identifying information was removed from any recorded conversations.

Trustworthiness and Validation

Triangulation of data was achieved through three different sources: the qualitative interviews of students and HIP administrators, the quantitative survey data, and the written responses of HIP administrators. Peer review and debriefing of the data and methods occurred through the researcher's graduate committee. The researcher also looked for any disconfirming evidence during the project. The researcher also engaged in member checking to seek participant feedback on the findings. Mertler (2019) provides several key indicators for providing validity in a mixed-methods design: Validity in mixed-methods designs can be

enhanced by drawing samples from the same population, which this study did. Questions for the qualitative portion were designed to help align with the existing quantitative data set that is already available. While we may not be able to give equal weight to one type of data over the other, the researcher considered how to weigh each data type to justify if one can be prioritized over the other. Efforts were made to use the qualitative data to support or illustrate some of the quantitative results. Efforts were also made to resolve any obvious discrepancies between the two data sets.

Ethical Considerations

Approval through the university's Institutional Review Board for research involving human subjects was obtained prior to collecting any data. Efforts to ensure the anonymity of participants were made and only the primary investigator knew their actual identities. All identifying information was removed (or aliases assigned) in any written, transcribed, or typed data. All participants were made aware of any potential emotional or psychological risks associated with the interview process prior to answering any questions or final agreement to participate in the study.

Due to the nature of one of the researcher's employment with the university, no students who were currently in one of their courses, or are registered for future courses with that researcher, were included in the participant pool. Consent for participation was obtained by using an informed consent letter provided to potential participants beforehand.

Data Collection

Interview data was recorded on an electronic recording device (a cell phone or digital recorder) and stored on the researcher's laptop in a local password-protected folder. Notes taken during the interview were taken by hand or on a word processor. All field notes were kept in a

locked cabinet. A research journal was kept electronically and recorded the researcher's memos, thoughts, observations, and other findings. All correspondence or signed materials from participants was kept in a secure, university Box folder. The folder was password protected to prevent unauthorized access. Any collected artifacts, such as written works, media, or printed materials on HIPs (i.e., a flyer about study abroad), photos, art, or any other physical material was stored in the researcher's office in a locked cabinet.

Quantitative data were provided by the "Plaindale" office of academic assessment in the form of the two surveys which were administered to all graduating seniors and first-year alumni. The data were scrubbed of any identifying data (names, university assigned ID number) prior to being provided to the researcher. These data are linked to demographic data from the student's records via the students ID number, which was replaced with a randomized number string.

Data Analysis

The researcher used voice transcribing software to convert all voice recordings from interviews into text. All computer-generated transcripts were checked for errors. In vivo codes were developed from transcribed interviews. After reading and "memoing" transcribed interviews, emergent ideas were identified. Codes were reduced to themes, and emerging patterns identified. A "point of view" indicative of the interpretive framework was created (Madison, 2011). Kuh's original conceptual framework surrounding high impact practices and Yosso's theoretical framework of cultural wealth was used to structure emerging themes that relate directly to research questions two and three. Case studies were used to focus on relationships and were used to simplify complex situations (Gomm, et al., 2000). Data was reported and displayed in an account of the findings.

Quantitative data were analyzed using SPSS statistical analysis software to look for any significant differences or correlations in participation rates among different HIP participant groups. The dataset available from the university on HIP participation contains data on an ordinal scale only, so a nonparametric chi-square test for independence was proposed to test to see if observed frequencies line up with what is expected. The variables in the datasets are only two levels, making them categorical, which means the assumption of a normal distribution cannot be met, eliminating the possibility of using parametric test for differences in means, such as a *t*-test (Privitera, 2015).

Summary

This mixed-methods proposal aimed to leverage both a case study qualitative analysis and a quantitative analysis of survey data to answer questions surrounding participation in high impact practices among college students at a major university who are primarily enrolled in STEM-related majors. By examining the relationships that students have with their culture, each other, teachers, and the practices themselves, the researcher hoped to shine a light into barriers to participation but also provide potential solutions to the administration as well as benefits to future HIP participants from all user groups. By examining these relationships in situ, HIP administrators may be able to leverage some of the findings in similar learning environments and cultural settings.

CHAPTER 4: RESULTS

Quantitative Results

The first research question this study sought to answer was: Are there significant statistical relationships in terms of participation in HIPs among various groups within STEM majors at "Plaindale" University? The data used to analyze and answer this question came from three different sets of data. The first data set focused on campus engagement and included questions related to student's participation in high impact educational experiences. These data are collected at the end of each semester and is a requirement of graduation; only seniors take the survey. This was the primary data set used to statistically analyze the number and frequency of students participating in HIPs. This campus engagement survey did not include demographic data but did include student identification numbers. The sample size for this data set was approximately 10,700 students over a four-year period comprised of students from majors focused on science, technology, engineering and math (STEM). Examples of selected majors include engineering, architecture, physics, biology, building science, agriculture, horticulture, forestry among others. Detailed names of colleges and majors are not described here to maintain anonymity for the schools and students involved.

A second data set provided by the university's registration records was used to link the engagement survey and student demographic data via student ID numbers. Prior to providing this data, the university administration assigned random values to the registration records instead of student ID numbers so that the data provided did not contain any private information. This was done by university staff and not the researcher. The demographic data contained information on ethnicity, gender, age, GPA, major, degree, and several other factors such as if

the student was a first-generation student, a transfer student, and the type of financial assistance being received.

The last data set came from a survey administered to students at the university 6 months post-graduation with questions regarding their career destinations, job types, anticipated salaries, and degree alignment satisfaction. While none of the data from this set were utilized in the statistical analysis of this research, the data were reviewed to potentially link career success to participation in HIPs, however, due to the differing time frames and the fact that this survey was voluntary instead of required, it was challenging to link the students' responses in a meaningful way. Instead, these data were used as background information. The National Survey of Student Engagement (NSSE, 2023) data set for this university was also reviewed for overall HIP participation and comparison to national and regional values. It is important to note that the NSSE data does not track individuals and is self-reported. The data sets used for statistical analysis (described above as data set #1 and set #2) come from the same period beginning in the fall semester of 2019 and ending in the spring semester of 2023.

Descriptive Statistics

The data set used for statistical analysis is described in the tables below. Table 3 describes the breakdown of the sample by gender. During the time frame of the data set, the questionnaire did not ask about other genders. There was a fairly even split between male and female respondents. Respondents who did not select a gender were marked as "none selected." Note that the terms for both race and gender used here are the exact terminology used in the data sets and may not be reflective of more recent terminology used in research.

Table 3

Descriptive Statistics for Sample by Gender

	None Selected	Female	Male	Total
Total	17	5370	5339	10726

Table 4 describes the sample data in terms of race and gender. Data regarding race and gender is self-reported. We can see that "White" students comprise most of the sample. The second largest group is Non-Resident aliens followed by Black or African American. Students in the underrepresented groups comprise 19.8% of the total sample. The groups considered underrepresented have a lower percentage representation than the national average (U.S. Census Bureau, 2023).

Table 4

Descriptive Statistics for Sample by Race and Gender

Race	None Selected	Female	Male	Total	%
American Indian or Alaska Native		13	15	28	0.26
Asian	7	112	133	252	2.3
Black or African American	3	302	245	550	5.1
Hispanics of any race		183	166	349	3.3
Native Hawaiian/Pacific Isl.		5	3	8	0.07
Non-Resident alien		229	478	707	6.6
Two or more races	2	122	100	224	2.0
Unknown		2	1	3	-

Race	None Selected	Female	Male	Total	%
Sub-Total of non-White	*12*	*968*	*1141*	*2121*	*19.8*
White	5	4402	4198	8596	80.0
Total	17	5370	5339	10726	

Table 5 describes the number of students in the sample who participated in at least one HIP broken down by gender. The HIPs surveyed included co-op, e-portfolio, internship, undergraduate research, and study abroad. A total of 7,746 students in the sample participated in at least one HIP during the sample time frame. Note that some students participated in multiple HIPs and those values are reflected in subsequent tables. More students participated in at least one HIP than none, with females participating in HIPs at a percentage of 7% more than males, a chi squared test for independence was performed to see if there was a correlation between gender and HIP participation. A breakdown of HIP participation by HIP type is provided in Tables 8 and 9.

Table 5

Descriptive Statistics for HIP Participation by Gender

HIP	None Selected	Female	Male	Total	Percent
No	13	1260	1707	2980	27.8%
Yes	4	4110	3632	7746	72.2%
Total	17	5370	5339	10726	

Table 6 shows the number of HIPs participated in by students as broken down by race. Also shown is the average number of HIPs participated in by students. While certain groups had a higher overall percentage of participation, the data cannot be used for a means comparison because it is ordinal data, so a chi squared test was used instead.

Table 6

Descriptive Statistics for HIP Participation by Race

# of HIPs	Amer. Indian or Alaska Native	Asian	Black or Afr. Amer.	Hisp. of any race	Native Haw. /Pacific Isl.	Non-resident	Two or More Races	White	Total
0	9	89	200	91	5	250	62	2251	2963
1	11	93	234	162	3	301	101	4139	5055
2	7	55	84	69	0	113	44	1767	2146
3	1	7	25	22	0	28	14	361	458
4	0	0	3	5	0	7	1	61	77
5	0	1	1	0	0	8	0	17	27
Total	28	245	547	349	8	707	222	8596	10726
Avg.	1.00	0.93	0.90	1.11	0.38	0.96	1.06	1.06	1.04
% HIP participation	68%	64%	63%	74%	38%	65%	72%	74%	72%

Table 7 shows descriptive statistics for the sample sorted by race, gender, grade point average (GPA) according to HIP participation. With one exception, students in the sample who participated in at least one HIP had a higher average GPA than those who participated in no HIPs: Non-resident Alien had the same GPA for students regardless of HIP participation. GPA

differences were not checked for statistically significant differences. Table 7 also shows relative GPA among students by gender and race.

Table 7

Descriptive Statistics for Sample by Race, Gender, and GPA

	GPA			
	Female		Male	
Race	No HIP	Yes HIP	No HIP	Yes HIP
American Indian or Alaska Native	2.60	3.27	2.69	3.01
Asian	3.35	3.40	3.01	3.28
Black or African American	2.84	3.03	2.68	2.90
Hispanics of any race	3.13	3.34	2.94	3.12
Non-Resident Alien	3.21	3.21	2.95	3.02
Two or More Races	3.19	3.42	2.90	3.20
White	3.23	3.43	3.01	3.19
Total				

Table 8 shows employment success for the sample based on race and HIP participation (No HIP participation versus participation in at least one or more HIP). This data is based on a self-reported questionnaire given to students at the time of their graduation. The category "education" represents the fact that students were continuing another degree, enrolled in a post-secondary program, or still working to finish a minor. Most students in this category were pursuing a graduate degree, either master's or doctorate. Graduates who participated in at least one HIP universally had higher success rates in gaining full time employment than those students who did not participate in a HIP. Some categories were intentionally left out of this table

including “volunteer”, “not reported”, and “n/a” as the percentages of students reporting these options was very low.

Table 8

Descriptive Statistics for Sample by Race, HIP Participation, and Employment Status at Graduation

Race / HIP Participation	Education	Full Time	Military	Not Seeking	Still Applying	Still Looking
Asian						
No HIP	12.0%	15.7%	2.4%	1.2%	10.8%	57.8%
Yes HIP	17.6%	26.4%	2.7%	1.4%	15.5%	36.5%
Black or African American						
No HIP	14.7%	10.9%	3.8%	1.3%	17.9%	51.3%
Yes HIP	17.0%	32.5%	0.7%	1.4%	19.9%	28.5%
Hispanic						
No HIP	10.7%	24.0%	1.3%	1.3%	14.7%	48.0%
Yes HIP	18.5%	37.5%	1.4%	1.4%	6.0%	35.2%
Non-Resident Alien						
No HIP	24.3%	8.1%	0.0%	9.9%	23.0%	34.7%
Yes HIP	36.1%	9.5%	0.0%	9.5%	21.4%	23.5%
Two or More Races						
No HIP	19.3%	19.3%	10.5%	0.0%	10.5%	40.4%
Yes HIP	23.8%	32.2%	1.4%	0.7%	9.8%	32.2%
White						

Race / HIP Participation	Education	Full Time	Military	Not Seeking	Still Applying	Still Looking
No HIP	17.8%	27.6%	5.6%	1.3%	8.6%	39.2%
Yes HIP	18.7%	41.8%	1.0%	0.5%	7.7%	30.4%

Table 9 shows the breakdown in percentage of students who participated in selected HIPs by race. For example, out of the students who participated in Co-op, 3.7% of them identified as Black or African American. Students may have participated in multiple HIPs and those values are reflected in this table, the total number of students participating in at least one HIP remains 7,746. The survey did not ask about other specific types of practices, as these five selected were considered to encompass most HIP experiences being taken part of by undergraduate students. These five experiences were selected for the survey based on previous data sets regarding HIP participation at "Plaindale" University.

Table 9

Descriptive Statistics for Sample by HIP Type and Race

Race	Co-op	E-portfolio	Internship	Undergrad Research	Study Abroad
American Indian or Alaska Native	0.1%	0.3%	0.3%	0.1%	0.2%
Asian	3.0%	1.9%	2.0%	2.9%	1.1%
Black or African American	3.7%	4.4%	4.1%	4.6%	2.5%
Hispanic	2.6%	2.6%	3.1%	3.5%	4.1%
Native Hawaiian/Pacific Isl.	0.0%	0.0%	0.0%	0.1%	0.0%
Non-Resident Alien	5.6%	5.7%	3.2%	7.7%	11.5%

Race	Co-op	E-portfolio	Internship	Undergrad Research	Study Abroad
Two or More Races	1.5%	2.7%	1.9%	2.8%	1.8%
White	83.4%	82.4%	85.4%	78.3%	78.7%

Table 10 shows the breakdown of HIP participation by the type of HIP and gender. Males tended to participate at higher numbers than females in co-operative experiences, while females participated in e-portfolio programs at a higher number than males. Internships and Undergraduate research had similar levels of participation between genders, while Study Abroad experiences had a higher number of female participants. Note that this table reflects the *total number of HIP participations*, some students will have participated in more than one HIP.

Table 10

Descriptive Statistics for Sample by HIP Type and Gender

Gender	Co-op	E-portfolio	Internship	Undergrad Research	Study Abroad
Female	172	1168	2701	1189	974
Male	616	442	2420	928	554
Total	788	1610	5121	2117	1528

Chi-Square Tests for Independence

A chi-squared test for independence can be used with categorical variables to determine if there is a relationship between those variables or if they are independent. This section describes the statistical analysis of the data to test if there were relationships between race and HIP participation, as well as relationships between gender and HIP participation. Table 11 describes the chi-squared tests for independence to determine if HIP participation is related to a student's race. The analysis determined that for this sample, race is related to a student's participation in at least one or more high-impact practices.

Table 11 *Chi-Square Tests for HIP Participation by Race*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	49.176[a]	1	<.001		
Continuity Correction[b]	48.794	1	<.001		
Likelihood Ratio	47.697	1	<.001		
Fisher's Exact Test				<.001	<.001
Linear-by-Linear Association	49.171	1	<.001		
N of Valid Cases	10682				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 577.45.

b. Computed only for a 2x2 table

A chi-squared test for independence was computed to determine whether participation in high impact practices (HIP yes or no) is independent of race (White or non-White). The results

are significant, $\chi 2(1) = 49.176$, $p = <.001$, Cramer's V/phi = .068. The null hypothesis that HIP participation is the same across race (White, non-White) is rejected and concluded that HIP participation is related to race among this sample of students. Table 6 showed that White students participated in HIPs at Plainview at a higher percentage than other groups except for Hispanics of any race during this period.

Table 12 describes the chi-squared tests for if HIP participation is related to a student's gender. The analysis determined that for this sample, gender is related to a student's participation in at least one or more high-impact practices.

Table 12

Chi-Square Tests for HIP Participation by Gender

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	96.570[a]	1	<.001		
Continuity Correction[b]	96.146	1	<.001		
Likelihood Ratio	96.845	1	<.001		
Fisher's Exact Test				<.001	<.001
Linear-by-Linear Association	96.561	1	<.001		
N of Valid Cases	10726				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 1479.35.

b. Computed only for a 2x2 table

A chi-squared test for independence was computed to determine whether participation in high impact practices (HIP yes or no) is independent of gender (male or female) *. The results

are significant, $\chi 2(1) = 96.570$, $p = <.001$, Cramer's V/phi = .095. The null hypothesis that HIP participation is the same across gender (male, female) is rejected and concluded that HIP participation is related to gender among this sample of students. Table 10 showed that, except for co-op, female students participated in more overall HIPs than their male counterparts. **The original dataset did not allow for other gender types, so data were only analyzed in terms of these two genders*.

Qualitative Results

Qualitative data were collected from a variety of sources. The researcher conducted eight separate interviews with undergraduate students who were currently enrolled at the university. These interviews were conducted between the individual participant and the researcher. Table 13 shows the demographic data for the eight student participants who were interviewed. Approximately 300 students were identified and contacted as potential participants. These students were initially identified using specific criteria such as major, race/ethnicity, gender, and year. Representative cases were selected for study inclusion (Creswell & Poth, 2018). Seventeen students responded to the invitation to interview, out of those 17 who agreed, 11 were interviewed. The researcher chose these eight specific cases for inclusion based on the quality and rigor of the interview response (Lieberson, 1991). Three of the interviews are not included in the results due to lack of quality in the interview response. Two of the interviews were cut short due to unplanned interruptions and participants did not reschedule. A third, unused, interview was excluded after the participant requested their response not be shared, used or published. Participants in the qualitative interviews were all students, faculty, or administrators during all or part of this same period. The sample of participants in the qualitative data

(interviews, etc.) have all participated in HIPs during at least a part of the same sample time frame as the quantitative data sets used for statistical analysis.

Table 13

Descriptive Statistics for Qualitative Data: Students

Ethnicity	Gender	Age	Year	GPA	First Gen.?	Transfer?	2nd Degree?	# HIPs
White	F	26	1	3.12	No	Yes	Yes	1
Asian/ Pacific Islander	M	20	2	3.92	Yes	No	No	2
Asian/ Pacific Islander	F	19	2	3.74	Yes	No	No	2
African American	F	44	4	2.32	No	No	No	0
African American	F	21	3	2.97	No	No	No	1
African American	F	19	2	2.9	Yes	No	No	0
African American	M	22	3	3.22	Yes	Yes	No	1
African American	M	23	2	2.65	No	No	No	3

Each interview followed an interview script, gave time for open-ended answers and discussion, and generally lasted between 20 minutes and one hour. These interviews were recorded using an audio recording device, then transcribed using audio transcription software. Each transcription was manually checked for any errors, corrected, and any identifying information such as names, places, and dates were removed. Following each interview, the researcher wrote interview notes summarizing the experience and providing context. Only one student provided additional information post-interview.

Six interviews with faculty and staff currently employed at the university who were responsible for administering a type of HIP were also conducted. At the time of the interviews,

the researcher identified 33 individuals who were solely or partially responsible for the administration of high impact educational practices at the university. After reaching out to these 33 individuals, 23 responded, and six agreed to be interviewed. These interviews did not follow a general script but were generally directed along the same lines of discussion and questions. Faculty and staff interviews ranged from 20 minutes to 45 minutes in length. Interviews with faculty and staff were conducted at various locations around campus but were always exclusively one-on-one interviews between the researcher and participant. The following table describes the demographics of the administrative participants.

Table 14

Descriptive Statistics for Qualitative Data: Administrator Interviewees

Name	Ethnicity	Gender	Age	Exp	Deg
HIP Admin 1	White	M	42	10	MS
HIP Admin 2	White	F	n/a*	4	PhD
HIP Admin 3	White	M	57	9	PhD
HIP Admin 4	African American	n/a*	n/a*	12	PhD
HIP Admin 5	African American	F	33	6	MS
HIP Admin 6	African American	M	n/a*	22	PhD

**Participants chose not to provide this information or asked to have it withheld from publication.*

Again, like the student interviews, the researcher wrote interview notes summarizing each interview to provide context. Interview notes were written typically immediately following the interview, however, follow up notes were added if the researcher had additional thoughts or if the participant provided any later additional context. Administrative interviewees were given the

option to provide additional context on their own, three of which later provided some follow-up thoughts via email.

In addition to the student and administrator interviews, a short seven-question survey was administered to the same 33 faculty, staff, or administrators who were identified as being involved with (or in charge of) administering HIPs on campus. The survey received 13 responses (57% response rate). This survey was not included in the quantitative data as the purpose of the survey was not to collect a quantitative data set, but to help form questions and discussion topics for the HIP staff and administrator interviews. The complete survey can be found in Appendix 2. The researcher felt the results of the survey were worth sharing, however, which are shown in Figures 1 through 7 below. This survey and questions were designed according to guidelines for designing web and mobile questionnaires (Dilman, Smyth, & Christian, 2014). A brief pilot of the survey was provided to volunteer faculty with experience in survey instrument design and feedback was used to update the survey. Responses were anonymous, although many of the participants in the survey were also in the same sample pool for the interviews.

Figure 1 shown below provides the results from question 1 where respondents were asked if the agreed with the statement "the high impact practice I am involved with has a diverse group of participants." Responses were mixed with 7 indicating they felt their HIP participants represented a diverse group and 6 indicating a non-diverse group of participants.

Figure 1

Results for HIP Administrator survey question 1

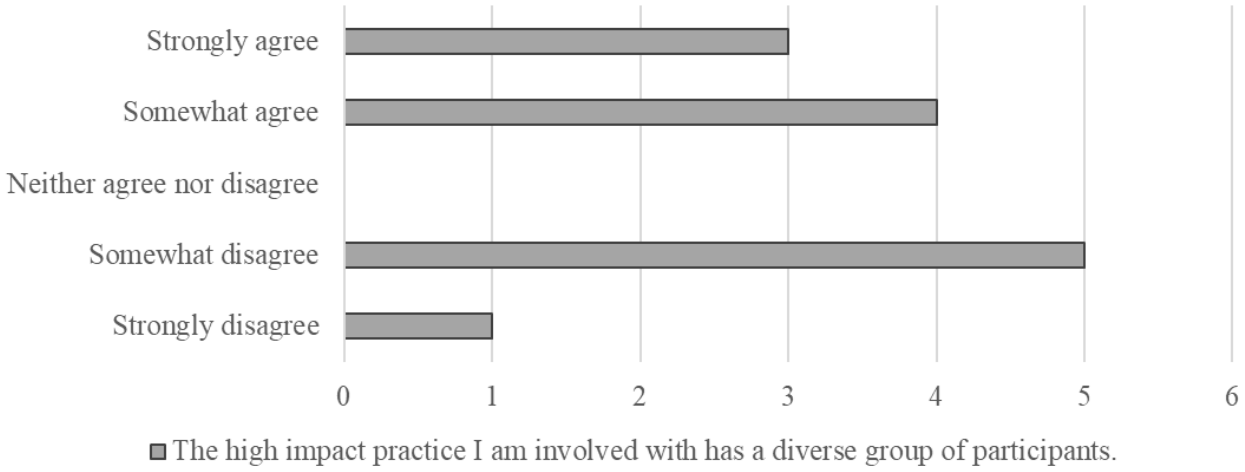
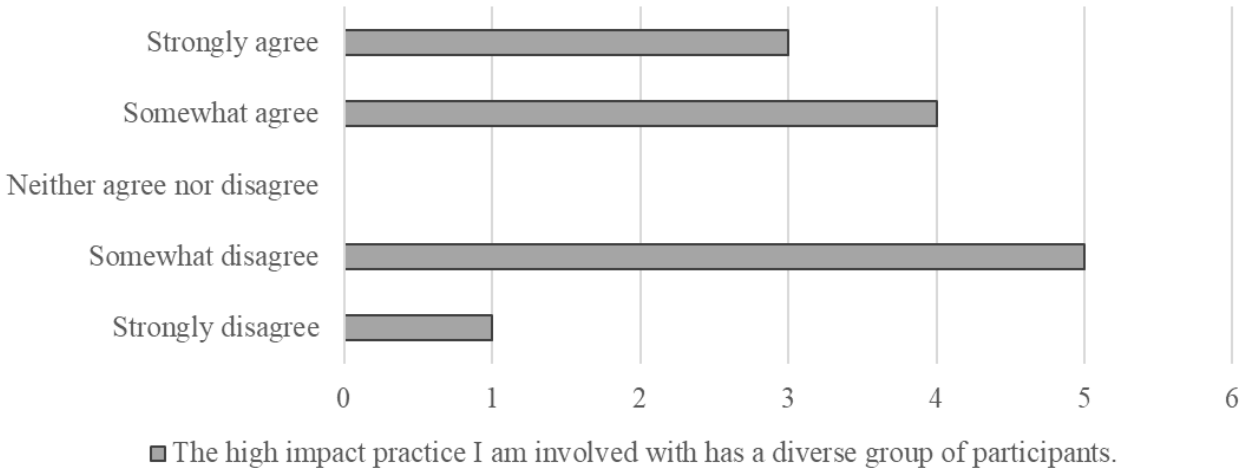


Figure 2 below shows the results for the second survey question where respondents were asked to mark their level of agreement with the following statement: "Students encounter barriers to participation with the high impact practice I am involved with."

Figure 2

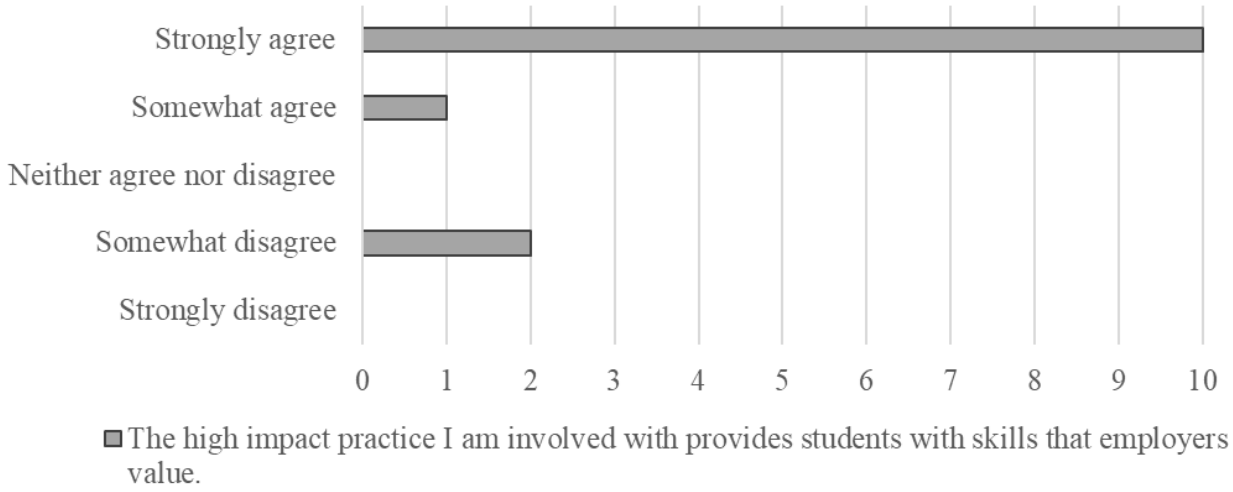
Results for HIP Administrator Survey Question 2



asked to mark their level of agreement with the following statement: "The high impact practice I am involved with provides students with skills that employers value."

Figure 3

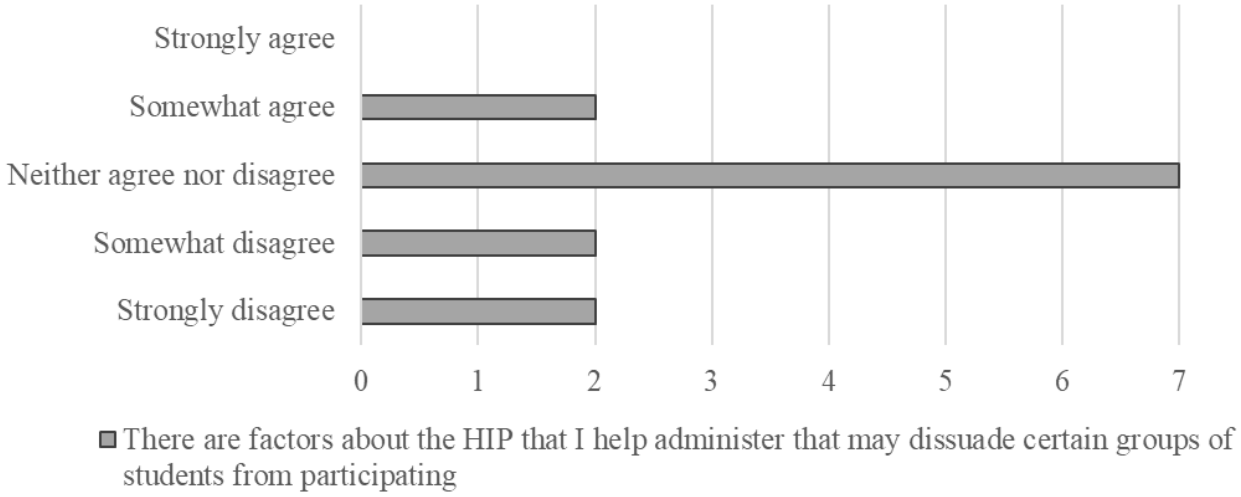
Results for HIP Administrator Survey Question 3



HIP that I help administer that may dissuade certain groups of students from participating."

Figure 4

Results for HIP Administrator Survey Question 4



participation. Respondents were not provided with examples of barriers nor were explanations of what types of assistance qualified were provided. No respondents indicated they did not help students who encounter barriers to participation in the HIP they administer. Only three respondents indicated the provided "a little" assistance, while most respondents (10) indicated they provide "a moderate amount", "a lot", or "a great deal" of assistance.

Figure 5

Results for HIP Administrator Survey Question 5

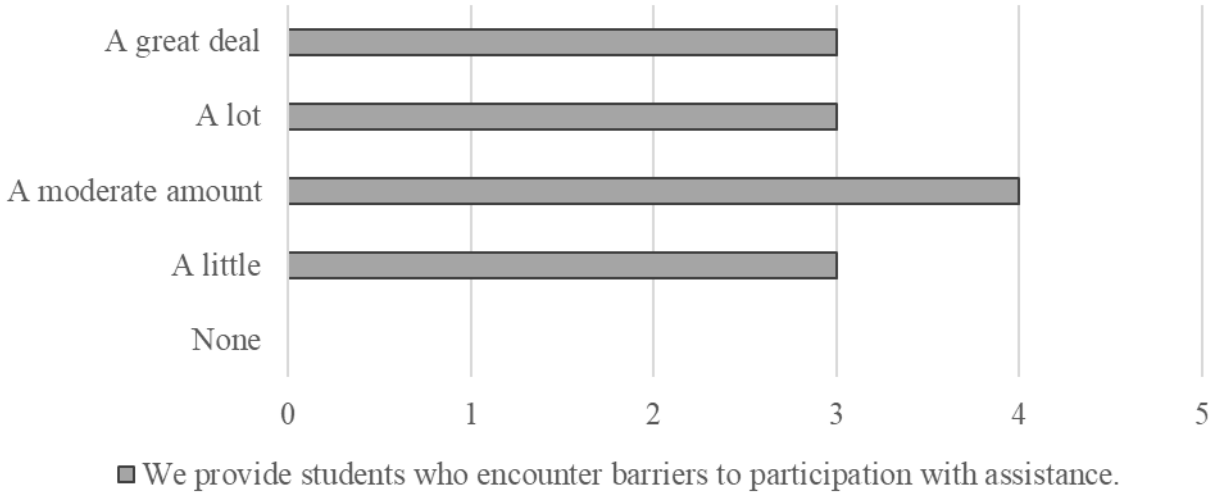


Figure 6 below shows the results for the sixth survey question regarding if HIP administrators solicit feedback from student's about the experience with the HIP. Most respondents indicated they solicit feedback from student participants "Most of the time."

Figure 6

Results for HIP Administrator Survey Question 6

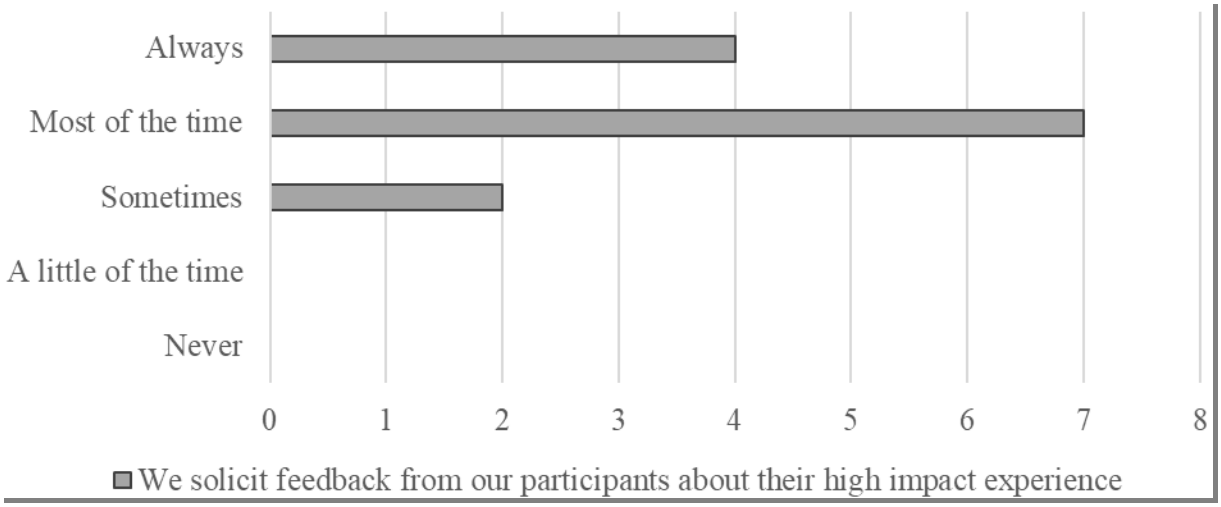
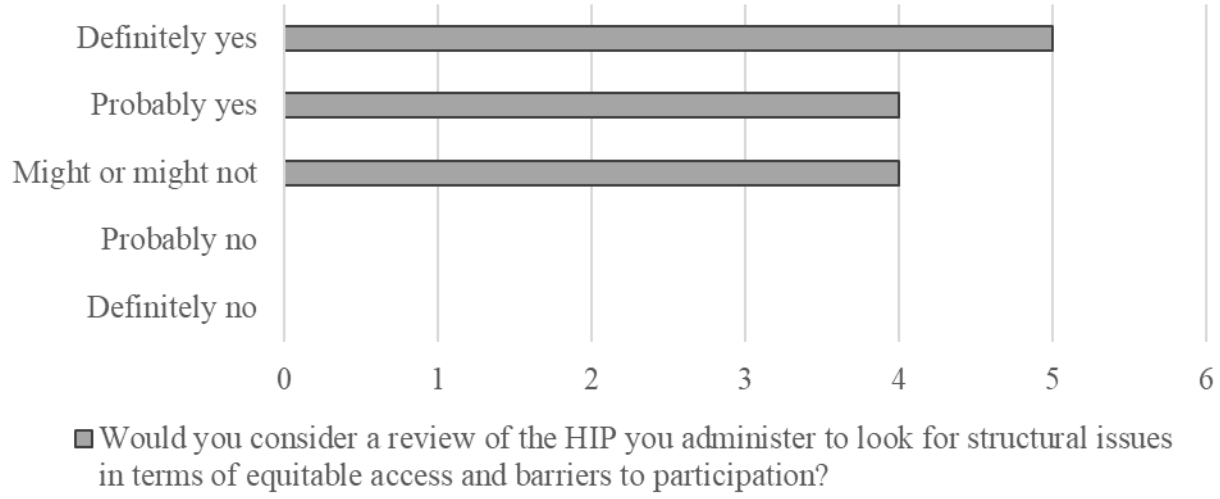


Figure 7 shows the results from the seventh and final question from the HIP adminstrator survey asking if respondents would consider a "review" of the HIP they help administer to look

for issues regarding equity, access, and barriers to participation. While most respondents indicated they would allow a review, four were ambivalent about the question indicating they "might or might not" ask for a review.

Figure 7

Results for HIP Administrator Survey Question 7



Figures one through seven provide a mixed view of results, with respondents indicating a variety of responses. Figures 6 and 7 provided the clearest results, with most of the responses to these two questions being neutral or positive. Figures 1 through 5 focused on respondents' views regarding HIP barriers and results varied, not showing any trends in the positive or negative.

Case Studies

Themes

Each interview was recorded and transcribed. Transcriptions were input into a software program and coding took place using categorical aggregation (Stake, 1995) generated by the software program and additional aggregate coding performed manually by the researcher. Codes from both methods were reviewed, combined, and grouped into two codebooks: One for the student interviews and one for the HIP administrator interviews. Codes were reviewed and

selected based on several criteria, including frequency of appearance, relevancy to the overall research, and relationships to one another. The aggregated codes were reviewed and selected based on the two main theoretical frameworks. Codes were grouped based on these frameworks and groups of codes were condensed into larger ones. For instance, when interviewees discussed aspects of college life, like their classes, teachers, living situation, campus life, or navigating college, those codes were condensed to "college characteristics." Certain words or phrases were added to the list of codes based solely on frequency of use, however, in the context of the interview, some codes (like "practice") simply showed up as a frequently used phrase. Codes were then compared to the interview notes and memos written by the researcher. Case themes were developed for each case "group" in a cross-case synthesis (Yin, 2014). using the codes, memos, notes, and by relating them to the frameworks as described in Chapter 3. Table 15 summarizes the codes developed for each group:

Table 15

Summary of Code Counts for each Case Group

Students Case		HIP Administrator Case	
Code	Count	Code	Count
College Characteristics	36	Student Characteristics	49
High Impact Practices	34	Student Groups	45
School Characteristics	18	High Impact Practices	39
Class Characteristics	17	Underserved Students	22
Student Characteristics	17	Diversity	20
Values	16	Minority	18

Students Case		HIP Administrator Case	
Engineering	15	Degree Program	13
Research	13	Issues	9
Time	13	Assistance	7
Money	11		
Jobs	10		
Paying	9		
Skills	8		
Ethics	7		

Codes were related to the frameworks of community cultural wealth (Yosso) and eight factors of high-quality HIPs (Kuh) by interpreting the codes in situ within interview transcripts to add additional context. Table 16 summarizes each framework:

Table 16

Summary of each Framework

Author	Framework	Description
Yosso	Community Cultural Wealth	**Aspirational value:** the ability to hold onto hope in the face of structured inequality and often without the means to make such dreams a reality **Familial value:** refers to those cultural knowledges nurtured among familia (kin) that carry a sense of community history, memory and cultural intuition **Social value** can be understood as networks of people and community resources. These peer and other social contacts can provide both

Author	Framework	Description
		instrumental and emotional support to navigate through society's institutions **Linguistic value** includes the intellectual and social skills attained through communication experiences in more than one language and/or style **Resistant value** refers those knowledges and skills fostered through oppositional behavior that challenges inequality **Navigational value** refers to skills of maneuvering through social institutions. Historically, this infers the ability to maneuver through institutions not created with Communities of Color in mind.
Kuh	Eight Factors of High-Quality HIPs	**Performance expectations** set at appropriately high levels. **Significant investment** of time and effort by students over an extended period **Interactions** with faculty and peers about substantive matters **Experiences with diversity** Frequent, timely, and constructive **feedback** Periodic, structured opportunities to **reflect and integrate** learning. Opportunities to discover the relevance of learning through **real-world applications.** **Public demonstration** of competence

For each code a notebook was kept on the contextual information around where the code was found, and how these codes and context related to both frameworks. Themes were developed from relating codes to frameworks. Following coding of all interview transcripts, all interview transcripts along with the researcher's own post-interview notes were re-read and compared to the codes and frameworks where relationships began to emerge. These relationships were then distilled into patterns and themes.

The following sections provide detailed context for each code, how it relates to a framework, and what barriers may have been discussed or acknowledged. Themes were developed from case codes and can be found in Table 17.

Student Case Codes

- College Characteristics
    - *Notes:* Most of these mentions relate to student's valuation of a college education and experience. Several relate to how students navigate through the college experience.
    - *Relationship to frameworks:* Navigational - students value their own ability to navigate through college. Aspirational - students value the result of earning the degree (jobs, money, security) as well as the potential the degree has for them to contribute back to their communities. This included finding suitable HIPs that appealed to their aspirations or ability to navigate to or within a particular HIP. Certain HIPs were *not* appealing precisely because they required a significant time or expense investment. Some students found the lack of diversity within a particular HIP did not motivate them to participate.

- *Barriers discussed or acknowledged:* Student's acknowledged the lack of diversity (real or perceived) within the HIP. Misalignment between aspirational values of student and portrayed or assumed values and outcomes of the HIP. A significant investment of time required to participate in a HIP becomes a navigational obstacle for students.

- High Impact Practices
  - *Notes:* There is a wide variety of discussion on this theme in the interviews and memos. This code shows up mostly because the phrase is used repeatedly by both interviewer and interviewees.
  - *Relationship to frameworks:* Several students mentioned not having positive interactions with faculty during HIP participation due to a lack of understanding by faculty of underserved student groups social cultural wealth, (but also a lack of interaction with faculty about substantive matters.)
  - *Barriers discussed or acknowledged:* Reluctance by students to participate in a HIP where the other participants and administrators were not from the same or similar underrepresented student group.
- School, Class, & Student Characteristics
  - *Notes:* These codes focused mostly on the student's experience navigating through school, class, or as themselves.
  - *Relationship to frameworks:* Navigational - how students were able to navigate through school. Students discussed time management and the value of time. Familial - Some students value time for being able to work to pay for school, living expenses, or support family members.

    - *Barriers discussed or acknowledged:* Some HIPS were too time consuming for underserved student groups. Participating meant time away from focusing on school and class or part-time jobs, or time needed to support family.
- Values
    - *Notes:* These centered on discussions of student's general values, but also what they valued in a HIP.
    - *Relationship to frameworks:* Familial - related to valuing the relationships students had with extended family members, but also how those family members imparted their cultural values on them. Underserved students value the opportunity to gain real-world experience. Aspirational - like the college characteristics code, students value the potential of the degree, but also the potential of a HIP to improve their job outlook or improve their resume.
    - *Barriers discussed or acknowledged:* Some HIPs did not have a "real-world" experience, which are valued experiences for underserved student groups. Misalignment between what underserved students value and what HIPs are providing as value.
- Engineering & Research
    - *Notes:* Engineering is a time consuming major and puts pressure on students in terms of being able to devote time and effort to HIPs.
    - *Relationship to frameworks:* Navigational - trying to navigate through a STEM major can be difficult enough for underserved groups without trying to sign up for outside activities like HIPs.

    - *Barriers discussed or acknowledged:* Some HIPS are too time consuming for underserved student groups. Time away from focusing on school and class or part-time jobs, or time needed to support family.
- Time, Money, Jobs, & Paying
    - *Notes:* Related directly to financial pressure felt by students.
    - *Relationship to frameworks:* Navigational - trying to navigate financing a college education.
    - *Barriers discussed or acknowledged:* Money barrier - students will sometimes prioritize paying for tuition and living expenses over any HIP experience. Students make value judgements in these cases and underserved student groups represented here seem to not see enough value in some HIPs to make them worthwhile. There were exceptions, of course, where students saw value in a HIP like co-op because they made money at the same time.
- Skills
    - *Notes:* Underserved students saw the value in learning new skills through HIPs.
    - *Relationship to frameworks:* Familial and Aspirational - valued opportunity to learn practical skills to self-improve but to also improve job prospects. Real-world applications within HIP were not shown or not present.
    - *Barriers discussed or acknowledged:* Practical, real-world skills not seen within HIP portrayal or experience leads to lack of participation.

HIP Administrator Case Codes

- Student Characteristics

- *Notes:* Administrators tended to focus on the students and how they interacted with the HIP. Student performance during HIP participation was also a common theme.
- *Relationship to frameworks:* Administrators looked at students through a lens of performance expectations. There seemed to be a disconnect between administrators' expectation of high performance and how students perceived that factor. Several acknowledged that time and money were probably barriers for underserved student groups.
- *Barriers discussed or acknowledged:* Some discussion on administrators not being able to attract underserved student groups to HIPs. There was a lot of speculation on the part of administrators as to the reasons why UR groups participated at lower rates.

- Student Groups
  - *Notes:* Like student characteristics, with the focus on groups of students instead of individuals.
  - *Relationship to frameworks:* Social - Administrators (even those from similar underserved groups) seemed to be hesitant to want to provide the type of emotional support underserved student groups may be seeking as part of their HIP experience, or simply unaware of this aspect.
  - *Barriers discussed or acknowledged:* Lack of awareness of the type of social support underserved student groups are looking for when deciding to participate in a HIP.
- High Impact Practices

- *Notes:* There is a wide variety of discussion on this theme in the interviews and memos. This code shows up mostly because the phrase is used repeatedly by both interviewer and interviewees.
- *Relationship to frameworks:* Feedback from students about the HIP experience does not seem to provide the type of information to HIP administrators that would likely improve the HIP for underserved student groups.
- *Barriers discussed or acknowledged:* Not utilizing feedback to improve HIP for attracting underserved student group participation.

- Underserved Students, Diversity, Minority
  - *Notes:* These codes show up because of direct discussion of diversity and inclusion as it relates directly to HIP administration. “Minority” code mostly from discussion of students in the minority or as "minority" student populations and groups.
  - *Relationship to frameworks:* Experience with diversity - most HIPs at “Plaindale” did not provide a diverse experience, with some exceptions. Navigational - underserved student groups sometimes must work against labels and stigmas or preconceptions around the term "minorities.”
  - *Barriers discussed or acknowledged:* Probably not a direct barrier in this context, but simply part of the administrative system that was historically not built for underserved student groups but for White students. Classification and grouping as "minority" then become a part of the system and may bias HIP Admin against underserved students who they may view as different or as having to require additional "help."

- Assistance
    - *Notes:* HIP administrators discussion of various assistance provided (or not) to students within their HIP.
    - *Relationship to frameworks:* Navigational - investment of time and effort. Assistance was discussed as both real and hypothetical.
    - *Barriers discussed or acknowledged:* Researcher found very little real assistance provided to any students for HIP participation. Some offered scholarships, but most assumed students would input the time, money, effort, or whatever was needed to be successful in the HIP. Many HIP administrators seemed to assume the value of the experience itself would outweigh any potential barriers students may encounter.

Mixed Methods Findings

The point of interface for mixing the quantitative and qualitative research in this study occurred after both sets of data were analyzed independently (Creswell & Plano Clark, 2011). Students and administrators interviewed for this study were active on campus during the same time the quantitative data used was collected. In the mixed method design of this study, the quantitative analysis and interpretation occurred first, and was followed by the qualitative data collection, analysis and interpretation (Creswell & Plano Clark, 2011). From a larger quantitative perspective, studies have shown that at higher education institutions across the United States, underrepresented student groups tend to participate in HIPs at lower rates than their White peers (Kuh, 2008, Finley & McNair, 2013). This trend held true in this study, with a significant correlation between race and HIP participation shown for students at Plainview University, with, again, underrepresented student groups being the lower participatory group.

This study design was chosen so that a definitive answer to the initial (and first) research question could be confirmed, in essence, the "how" (i.e. How often are various student groups participating in HIPs?) so that the next questions of "why" could be formulated, asked, and analyzed. While the quantitative phase did not necessarily provide direct pathways to the types of questions being asked during the qualitative portion of the study, it did confirm that those questions needed to be asked in the first place. The quantitative portion also confirmed the ongoing issue of differential participation in HIPs among various student groups observed in prior research. Indeed, in the qualitative interviews of students, most of the participants told stories of barriers faced when attempting to gain entry or participate in HIPs, while the administrative interviews confirmed a lack of acknowledgement of the issue of differential HIP participation at Plainview University. Even the student interviewees who came from underrepresented groups that were able to participate in multiple HIPs still shared stories of friends or peers who encountered barriers and were familiar with navigating a system not necessarily designed to facilitate equitable participation.

Qualitatively, this study found answers from respondents of all groups that confirmed the quantitative results, but that also provided a clearer picture of the types of questions that need to be asked to provide additional (and better) quantitative data. Questions asked of current students and graduates could better reflect the values of different student groups, as well as the quality factors of HIPs themselves. From interviewing HIP administrators, it can be shown that there is value in gathering high quality quantitative response data from faculty, administration, and staff involved in the administration of HIPs. While many previous studies into HIP participation and effectiveness have performed extensive quantitative analysis at scale, asking qualitative

questions provided an opportunity to understand the "why", and not just the "how" of HIP participation.

Summary of Findings

The data sets show differences in achievement metrics between races and genders in terms of students who have participated in at least one high impact educational practice versus none. Overall, those students in this sample who completed at least one HIP had a higher GPA (Table 5) and better employment rates at graduation (Table 6). This is consistent with the findings of Kuh (2008) and many others who have shown that significant differences in outcomes for students who participate in HIPs when compared to those who do not, with a larger impact occurring among underserved student groups. Although this study did not seek to answer if there were significant statistical differences in achievement or learning outcomes for HIP versus non-HIP student's (only relationships between groups in terms of rates of participation) the researcher has relied on numerous previous studies which have shown that student achievement outcomes such as GPA, job placement, starting salaries and deep learning all significantly improve for students who participate in HIPs. (Kuh, 2008) (Finley & McNair, 2013). This research did not seek to answer the questions regarding HIP quality at "Plaindale" either, as this would have required a substantially different direction in the research design and study.

Tables 7 and 8 show there are differences in the participation by type of HIP among different groups of students. Reasons for this are discussed in Chapter 5.

To test if there were any significant statistical relationships between HIP participation and race or gender, the chi-squared test for independence was used. Table 9 shows that there is a significant relationship between race and HIP participation, in terms of White students versus underserved students. Table 4 shows that White students represent the majority of students in

this sample of STEM majors at "Plaindale." Table 10 shows that there is a significant relationship between gender and HIP participation, in terms of male versus female students. Table 5 shows that in this sample, females participate in HIPs at a higher rate than males.

The qualitative results were used to develop two case studies: A student case and a HIP administrator case. Both students and administrators were interviewed individually, and an additional informal survey was provided to additional HIP administrators. Participants in the student case were purposefully sampled to solicit points of view from underserved student groups. HIP administrators were selected to sample a variety of HIPs. Descriptive statistics about the two groups can be found in Tables 13 and 14. Figures 1 through 4 show the results of the seven-questions survey provided to HIP administrators. Results from the survey were primarily used to compare HIP administrators' interview results.

Codes and themes were developed from transcriptions of interviews for both cases. Results for coding and theme development are shared in Tables 14 and 15 along with the notes, relationships to frameworks, and barriers discussed for the major coding. The major themes developed from this process were distilled from the survey results, coding, interviewee notes taken by the researcher, and observations about how coded results relate to the frameworks used in this study. These themes are used to develop the case studies described in Chapter 5. Table 16 provides a summary of the developed case themes:

Table 17

Summary of Identified Case Themes

Student Case Themes
• Conflict between the significant time investment required by some HIPs and underserved groups navigational cultural value. "Not worth my time."
• Underserved students cultural or social values not reflected in the HIP experience or portrayal - leads to a lack of interest, hesitancy on the part of underserved students to join, and a lower quality experience when compared to non-underserved students.
• Real or perceived lack of diversity within a HIP for both students and administrators. "No one looks like me."
HIP Administrator Case Themes
• Lack of understanding about the values or needs of underserved student groups during the time when these groups consider participating in HIPs.
• Hesitancy to change the way HIPs are administered or the HIP experience.
• Administrators have a good understanding of the value of HIP participation, but not the barriers encountered by underserved students.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Participation by underserved student groups at "Plaindale" University in high impact educational experiences during this study was observed to be lower than the majority group (Tables 11 and 12). During this same time, all students who participated in one or more HIP generally had a higher GPA and gained employment after graduation at a higher rate than students who did not participate in a HIP (Tables 7 and 8). By talking with both students and HIP administrators, this study sought to reveal some of the reasons why underserved students were participating in HIPs at lower rates. In listening to their stories and interpreting those stories, evidence of barriers emerged. The following case studies tell the stories that were collected, and assertions are made about each case. Rather than focusing on a single student or one administrator, each case was presented as a combination of cases. Please note that the names of all individuals used for quotations and stories have been changed to protect identities.

Case Studies

The Student Case: Missing Out

As a busy undergraduate student majoring in engineering, "Mary" was often pressed for time. Between completing homework, attending class, working a part-time job, and navigating her social life, Mary spent very little free time on herself. Despite this, Mary had been interested in participating in undergraduate research – especially with a particular professor whose lab performed research she had been interested in. The lab specialized in researching a topic that was closely aligned with Mary's values. Mary grew up in a small rural community that had been affected by a lack of infrastructure and access to a modern wastewater treatment system. The majority of people who lived in her community were black/African American just like herself.

She had witnessed firsthand the struggle families, and her neighbors faced daily from overflowing septic systems, untreated sewage polluting their yards, and the difficulty that the financial pressure placed on families required by officials to fix their septic systems. The lab she was interested in working in worked on these types of rural wastewater issues, and was performing research on ways to help communities and citizens effectively deal with these issues. "I wanted to work with Professor Z in his lab. He was willing to take me on, but when we talked about how much time I would need to be there, I just couldn't do it." Mary realized that the compensation she'd receive from working in the lab would be less than her part-time job, and that the resulting loss of income would mean an inability to pay for food, rent, utility bills, etc. "It hurt because Professor Z filled the position quickly and my chance was – poof – gone. If I hadn't had to worry about paying bills I wouldn't have missed out."

When asked what she meant by "it hurt" Mary responded that she felt like she missed an opportunity to help her community. When asked if she was "hurt" by missing the opportunity to participate in an experience that would benefit her as a student and in terms of her resume, Mary's response was: "…well, yeah, that too, but I hope I can find something else later on that means as much to me personally."

Mary valued the potential to help her community almost as much, or more, as the value participation in the HIP may have provided her personally. Mary's case is not unique, many of the participants interviewed indicated a valuation of the experience that may have not been the same as what HIP administrators anticipated students would value – a case of a misalignment of valuation between what underserved student groups truly value and what other participants may value and is often promoted as a benefit of the HIP. For example, at "Plaindale", many of the students in the majority value a study abroad experience for the chance to experience new

cultures, meet new people, and travel. However, when asked about reasons why he did not participate in a study abroad opportunity presented to him, "Reggie" shared the following: "I was interested in going, but when I started looking at the brochure, I realized I might be the only one on the trip who looked like me…"

The students interviewed for this study existed in a time of heightened tensions and awareness of race related issues in the United States: police brutality, social justice, and politically driven legislation that focused on race-based issues, were all prevalent in society and the news cycle during their time as students. Protests over the George Floyd murder occurred on campus during this time. The Supreme Court struck down the laws supporting affirmative action. Legislation was passed that forced "Plaindale" to remove any offices or programs with names like "DEI" or "diversity" and they were disbanded, renamed, and repurposed. Many of these programs specifically served minority student groups and their removal created an atmosphere of negativity and distrust in the underserved student community. Issues of civil rights, social and economic justice were often slow to change in the southeastern U.S. over the years, and while much progress was made, race-based incidents continued to occur at "Plaindale" University during this time. Many shared their experiences with navigating this environment as an underserved student, which included stories of race-related incidences experienced from fellow students, faculty, and administration. Beyond the obvious incidents, participants in this case acknowledged the more subtle and hidden ways that navigating through a university structure that was originally designed to primarily serve White students presented its own set of problems. While many of these navigational obstacles occurred, the focus in this study remained on the barriers that were cited by participants as affecting HIP participation. It

was important to note the broader context that these barriers existed within, and the context that many participants experienced while students at "Plaindale" University.

Interpretation and Case Assertions of the Student Case

A common barrier described by students was in direct conflict with a key factor of a high-quality HIP (Kuh, 2008) which was a "significant investment of time and effort by students over an extended period." Students in this case study often described their hesitancy to sign up to participate in a HIP because of the amount of time commitment required by the HIP, which took away from their time required to spend on other parts of their lives, such as working a full or part time job, take care of family members, or simply devote time to their existing schoolwork and classes. In a follow up interview with a participant who had originally indicated they had joined a particular HIP but had to drop out because of time constraints, the participant "Rob" stated the following:

> "Time is money. If I stayed in (redacted HIP) I would just lose money. I have to pay rent, buy food, books, whatever. I thought I could swing it, but after a few weeks I knew, it wasn't going to work."

Research has shown that underserved and underrepresented student groups often face additional time and financial pressures that other student groups do not (Chang, et. al. 2014, Perkins, 2020). Students in this case showed a desire to participate in HIPs and despite fully understanding the benefits to them and their community through participation, they were met with a built-in requirement of a "high quality" practice that caused many to choose not to participate.

Another barrier to participation for students interviewed in this case was that they often did not see their own cultural or social values reflected in the particular HIP. Places students

talked about "seeing" themselves reflected included HIP promotional materials (brochures, websites, posters), other HIP participants who had already been a part of the HIP or were actively participating, and HIP administrators. Underserved students wanted to see other students who looked like them participating. Students also indicated wanting to see their own cultural values reflected in the HIP, and that this was not always the case. When asked about explaining why he observed fellow underserved students being hesitant to participate in study abroad, "Reggie" shared this quote:

> "I don't think it's just the, you know, racial divides. I think it might be experience or fear. When the university talks about, when they send someone out to talk about those things, they probably should put some other faces out there to promote it because then, you know, students that might be a little afraid to venture outside of their little box, they'll be like, oh, you did it."

In the discussion with "Reggie" and others, participants shared that sometimes underserved students' values don't always align with a HIP's promoted values. This assertion dovetails into the next one, that of a real or perceived lack of diversity within a HIP.

Yosso's theory of community cultural wealth describes the "aspirational" value as the "ability to hold onto hope in the face of structured inequality…." Students interviewed for this case study indicated that by not seeing a more diverse group of participants in the HIP or in the HIP administration, they were hesitant to join. If participation in a HIP is dominated by a group and administered by that same group, underserved students are perceiving an existing inequality. "Brooke", an interviewee in this study, shared this about perceptions of HIPs that may lack diversity:

> "I mean, I would love to go to Spain, but when you look at like the pictures on their website of, of the groups and stuff that go to Spain, it's like, I don't know, dude. Like that's not my, that's not my group. You know what I mean? I mean, that's not me. So, I try to like, I try to get in where I fit in. You know what I'm saying?"

"Experiences with diversity" is one of Kuh's 8 important factors of a high-quality HIP. If a HIP cannot foster some level of diversity in its program or structure, students may take note of the inequality they observe (or perceive) and choose either to not participate or have a lower quality experience within the HIP.

The Open Door

The email was brief and to the point. "Mary" had written to update on her experience with attempting to find an opportunity to participate in undergraduate research. She had found a professor at a nearby HBCU who had performed similar research on the impacts of rural wastewater treatment in Mary's home state. Mary had reached out and made a connection and was now working with the professor on a project. Mary managed to maintain her job and was able to work with the new professor to come up with a plan and schedule that worked to meet both of their goals. She was excited about the opportunity and had written to provide an update: "I'm so excited to get started. When one door closes, another opens."

What was true in 2008 when Kuh looked at a large national data set and recognized that underserved students participated at lower rates, and again in 2013 when Finley and McNair performed their work is still true, to some extent, in the present day, for students at "Plaindale" University. While Mary's story turned out well, many other underserved students face a variety of obstacles, barriers, and hesitancies over participating in high impact educational experiences.

The Administrator Case: It's Not for Everyone

Susan leaned back in her chair and looked up thoughtfully. Her role as the administrator of one of the largest experiential experiences on campus seems to have placed a burden on her, the kind that produced thoughtful, carefully answered questions. The question that had been asked was "Do you think the way this HIP is administered is equitable to all student groups?" The answer was revealing, and shone a light on the hesitancy of HIP administrators to sometimes admit the practice they administer may not be structured in an equitable manner. Administrators also often exhibited a lack of understanding of the types of barriers to participation faced by underserved students who are interested in participating.

> "I think we could do a better job of recruiting all students, yes, but everyone can sign up and participate no matter what type of student they are. We don't have any restrictions for students to sign up and participate, it's open to everyone."

For Susan, the "restrictions" did not exist because there were none placed by the persons who administer the HIP. When asked about potential barriers for students who are considering applying to participate, her answer continued in the theme of possibly not understanding potential barriers. Additionally, she simply may have not acknowledged those barriers she knew existed and was unwilling to admit they existed for fear of making the HIP appear to favor only certain student groups. "I can't think of any reasons why students could not participate – I think it's not for everyone, obviously, but we don't try and exclude anyone."

Like the students' case, administrators at this time period at "Plaindale" experienced a society and culture with an increased awareness of racial and social justice issues. Although academic communities can often remain somewhat insulated from many of society's problems, the administration at "Plaindale" had to meet some of these issues head on, including

experiencing accusations of not being a friendly place for minorities, legislation passed that forced the university to close any offices and programs related to "diversity, equity, and inclusion", and the occasional protest or controversial speaker on campus. HIP administrators interviewed for this study were certainly aware of many of these issues, and most seemed very aware of the potential impacts some of them would have on the HIP they administered. "Plaindale" also lacked a central administration of high-impact practices, and administration of the practices was left to individual colleges, departments, or programs. Assessment of HIPs at "Plaindale" was only recently begun at the upper administrative level, with students required to answer a survey prior to graduation which included questions about HIP participation and the quality of the experience.

Interpretation and Case Assertions of the Administrator Case

When asked to describe any barriers to entry for their specific HIP, one HIP administrator said the following:

> "There are some physical factors I think that do dissuade certain students. If we're talking about different ethnicities, I, I don't think there's anything that really specific to ours that would dissuade certain students. Again, I, I know we don't have a diverse group of participants, but I think that is, I think that has way more to do with our degree program than necessarily this high impact practice."

The "physical factors" they referred to in the discussion were specifically, "minority" students from cities not wanting to participate because the HIP was held outside in the summer in a rural location. While this administrator admitted their practice had a lack of diversity, they seemed to lack an objective understanding regarding the barriers underserved students might encounter when considering participation in the experience. This attitude is reflected in the answers by HIP

administrators found in Figure 4 where they were asked if barriers even existed. Administrators making assumptions about what potential participants would value in the experience of the HIP showed a lack of understanding about what a diverse group of participants would actually value in the experience. Some, not all, of the administrators interviewed for this case directly disagreed with the assertion that structural inequalities could exist in the way the HIP was administered or at "Plaindale" at all.

Figure 7 showed how some administrators were resistant to reviewing the HIPs they worked with for potential structural issues. When asked if they would be willing to have their HIP reviewed for potential structural issues and barriers, one HIP administrator said this:

> "I don't know that it's necessary, but I wouldn't, I wouldn't be opposed to it. And if somebody wanted to come, I think it'd be, frankly, a waste of time. But, you know, I wouldn't stop anyone from doing it."

Many HIP administrators interviewed for this case were also unfamiliar with assessment practices for HIPs and Kuh's eight factors of high-quality practices. While many admitted that the participants in their practices tended to not be a diverse group, there seemed to be a hesitancy to directly address the issue.

One of the questions asked in the discussions with HIP administrators was "does the HIP you help administer provide a skill that employers value?" Many of the respondents provided multiple answers to this question when asked and were happy to discuss the value their particular practice provided to students. This attitude that their HIP provided strong value to students among administrators is reflected in the survey answers in Figure 3 as well.

We Can Do Better

In a follow up meeting with HIP Administrator "Tim" over coffee and pastry, Tim sat outside the campus library watching students hurry to their next classes, mingling with friends and classmates, discussing their next test, the past weekend, and a host of other topics. The discussion centered on initial findings from this study, Tim wanted to know what the early findings and conclusions were. He seemed, like many HIP administrators interviewed for this study, slightly hesitant to delve too deeply into issues of race or diversity. Prior to the meeting Tim was emailed a copy of several of Kuh's studies on HIPs, as well as the 2013 Finley and McNair report on assessing HIPs. After some initial pleasantries, Tim was asked if he had read the studies emailed to him. His response was telling: He set his coffee cup down, leaned forward, and in a more serious tone than he was using before simply said: "We can do better."

The discussion that followed centered on how administrators can do a better job of listening to underserved students, trying to understand their barriers to entry, and restructuring the HIP to better align with the aspirations and cultural values of a diverse group of potential participants. Tim stated: "This will not be a popular change – not in this climate. But I think we are doing our students a disservice if we do not make an effort to improve the recruitment and experience in [redacted HIP]"

Eventually the students walking by slowed to only a few, most having moved onto their classes. It was a bright, sunny spring day, and a nice breeze had kicked up. Tim finished his coffee, taking one last sip, and looked up at the front of the large library building where he worked. He commented on how "Plaindale" University was such a wonderful place to work and how much he enjoyed coming to work with students every day: "I think, though, we may have been missing out of working with, and serving, all of our students."

Conclusions

This study determined that participation in HIPs at "Plaindale" University varied among student groups and that the benefits of HIP participation were not evenly distributed among those groups. Real and assumed barriers to participation were identified by speaking directly with representatives from students and HIP administrators. Discussions with these groups helped to shed light on the different views on the value of HIPs, both real and perceived. Answers to the original research questions posed are found below:

- Are there significant statistical relationships in terms of participation in HIPs among various groups within STEM majors at "Plaindale" University?
    - A chi square test for independence showed a relationship between underserved student groups in STEM majors and HIP participation.
    - While not statistically significant, other variables, such as GPA and Employment showed the differences in outcomes experienced by those who participated in HIPs versus those who did not.
- What types of barriers to HIP participation can be self-identified by underserved student groups (and individuals) within STEM majors, specific to "Plaindale" University?
    - Students in the study indicated that time and financial pressures inhibited their willingness to participate in some practices.
    - A general lack of understanding of the barriers faced by underserved student groups by HIP Administrators.
    - Image problems with HIPs when promoting participation to underserved student groups – lack of diversity.

- HIP structure at “Plaindale” University doesn’t reflect some of the values underserved students are looking for (community value, aspirational value)
- Navigational hurdles are present which are often recognized by underserved students, but often these hurdles are not understood by HIP administrators.
- HIP administrators are willing to help or make a change to improve participation by underserved student groups but lack the motivation or support to do so. Some of this lack of motivation or hesitancy can be attributed to the political climate of the time.
- Certain high quality HIP factors such as significant time investments sometimes work against promoting HIP participation by underserved student groups where time investment and money are larger issues.
- Many barriers to participation were perceived by the student prior to deciding to open or close the door on HIP participation. HIP administrators were not often closely involved with students at this phase in decision-making.

- What do HIP experiences mean to underserved students in the context of their lives, educational experience, and ability to obtain a degree?
  - Some underserved students view HIP participation as a hindrance to navigating their required educational degree requirements. Navigating class and school is tough enough without adding additional time/money/social pressures.
  - Participants in HIPs generally benefited from the experience, as indicated by improvements in grades and employment success.

- While beneficial for all students, HIP participation has been shown to be especially beneficial for students in underrepresented groups or underserved groups.

Based on these conclusions, the following recommendations for improving the participation rates and experience of STEM majors participating in HIPs at "Plaindale" University are provided. While not an exhaustive list, these recommendations sought to specifically address the barriers identified by representatives from student groups as well as issues highlighted by HIP administrators surrounding HIP participation at "Plaindale" University during the time of this study.

Recommendations

- There is a need to improve how HIPs are promoted and marketed to students to reflect the values students hope to gain from experience. This could include a better explanation of the experience, requirements, and what students can hope to gain. Aligning the promotion and explanation of the HIP with a diverse group of student values may help remove or reduce participation hesitancy.
- Offer HIP experiences that have varying levels of participation to help reduce the time/money barrier. For example, shorter internships or co-op experiences that allow for flexible scheduling. Study abroad experiences may require subsidizing and additional scholarships to help reduce cost barriers. Choose different study abroad experiences that allow students to experience a more diverse range of cultures.
- Offer targeted scholarships for HIP participation to reduce the money barrier. Consider offering 'micro' scholarships for HIPs that do not typically include a compensation component.

- Audit HIP experiences for ways to improve underserved student participation and reduce barriers. Educate and train HIP administrators on ways to improve participation and reduce barriers.
- Improve assessment practices for HIPs specifically. Centralize and standardize HIP assessment. Provide feedback on an annual basis to HIP administrators regarding HIP quality indicators and student feedback.
- Create a university-level office for HIP administration which includes a directive to improve recruitment of underserved student groups to participate in HIPs.
- Create new HIPs designed from the outset to promote experiences with diversity.

Implications for Future Research

Future research into the identification of and reduction of barriers to participation in high impact educational practices among underserved students in STEM majors should include additional qualitative studies with students and HIP administrators at different types of schools and universities. Additional studies into the effectiveness of changes implemented to HIPs specifically meant to reduce barriers and increase underserved student participation need to be conducted. Future researchers should focus on action – implementing and trying out changes to HIPs to help improve participation by underserved student groups. Research should focus on the effectiveness of any interventions and share results with context. Researchers should continue to utilize all tools at their disposal, both quantitative and qualitative, and mixed methods analysis. While this study grouped students into larger "umbrella" terms such as "underserved" or "underrepresented", future studies should strive to view students as situated in a specific context, acknowledging that groups of students in the minority of the population can have a much

different set of cultural, aspirational, and navigational values than other students from different areas of the country.

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APPENDIX 1

Focus Group Script

First, thank you for taking the time to come this afternoon. As you read in your invitation, this is one of several meetings being held nationally with students to learn more about your experiences in college. The reason we are here today is to better understand the types of learning experiences you've been engaged in during your time at [institution name], how those experiences have affected your learning, and how those experiences have affected you as a person. We promise to only take about an hour and a half of your time this afternoon.

I also want to assure you that your names will not be disclosed or identified in later reports. We are only interested in getting your comments as a group. No individual names will in any way be connected to the comments you provide during our discussion.

Are there any questions before we start?

Outline of Questions and Probes:

Before we ask about your experiences as a student, we'd like to get your opinion on what college in general means to you.

1. In your opinion, what does a college education mean for individuals? In what ways does it matter to a person's future?
2. What do you believe potential employers are looking for in college graduates?
    a. What are the specific skills that you are learning (or hope to learn) in college that are important in the professional world?

3. How well do you think your high school education prepared you to succeed in college?
4. Could your high school (or schools) have done anything to better prepare you or your peers for college?
5. Thinking about your experiences as a student, how would you describe what it means to be engaged in your learning?
    a. How do you know when you're engaged in learning versus simply learning?
6. Students often learn better in particular types of environments or doing particular types of activities. In your college experience so far, have there been certain activities or situations (inside or outside the classroom) that allowed you to be more engaged in your learning? If so, please describe.
7. You all share in common that you have participated in particular types of learning activities or programs, such as [to be identified depending upon group]. How would you describe the ways in which being involved in one or more of these activities had an impact on your learning?
    a. How does this type of learning experience compare with other kinds of learning experiences you've had in college?
    b. What would you have changed about that experience to make it more engaging?
8. In what ways did this experience influence the ways in which you interacted with the people around you?
    a. For example, how did this experience shape your interactions with peers?
    b. What about with faculty?

c. What about people in the community (if applicable)?

9. What did you learn about yourself through participating in these learning activities or programs?
    a. What more did you learn about your peers?
    b. In what ways did this experience have an impact on your understanding of the community or the larger world?
10. What would you say most influences your decision to seek out and participate in specific types of engaged learning experiences—for example, service learning, undergraduate research (research with a faculty member), study abroad, or internships?
11. In what ways have these types of learning experiences encouraged you to think differently about what you might do on campus or even after you leave campus?
    a. Have these experiences had any influence in your interests or goals, short term or long term?
12. Has your engagement in these activities contributed to your social and ethical development?
    a. In what ways has your college experience prepared you to be a responsible and contributing member of your community?

Finally, thinking about your view of college overall [Facilitators provide students with a handout with two statements]:

This sheet lists two different views on the primary purpose and goal of a college education. Please read each statement and decide whether you agree with one of these statements, neither, or both.

View A: The most important goal of a college education should be to provide students with a broad, well-rounded education that enriches them to discover their interests and abilities, in order to help them realize their full potential in life.

View B: The most important goal of a college education should be to provide students with specific career knowledge and skills to help them realize their full potential in the workforce.

Probe: Which of these statements would you say comes closest to describing the emphasis of your college education thus far?

Ending the session

Is there anything that you feel we have missed or final comments you would like to add? Thank you all again very much for your time. And in case after you leave you have any additional thoughts or questions about our discussion, feel free to email us at: (email@university.edu)

Questions and script taken from "Assessing Underserved Students' Engagement in High-Impact Practices" written by Ashley Finley and Tia McNair (2013).

APPENDIX 2

HIP Admin Survey

Thank you for participating in this quick survey on identifying and assessing equity gaps in high-impact practices (HIP) among students. This survey is being administered as part of a research project in support of a dissertation. Results are kept anonymous but will be used in a published dissertation and potentially a paper or article. No identifying information about your or the HIP you are involved with is collected in this survey. If you have any questions or concerns, please contact Jonathan Davis at jnd0026@auburn.edu.

Survey instructions: Select the answer that best satisfies the statement or question.

Q1 The high impact practice I am involved with has a diverse group of participants.

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q2 Students encounter barriers to participation with the high impact practice I am involved with.

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q3 The high impact practice I am involved with provides students with skills that employers value.

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

Q4 We provide students who encounter barriers to participation with assistance.

- None at all (1)
- A little (2)
- A moderate amount (3)
- A lot (4)
- A great deal (5)

Q5 There are factors about the HIP that I help administer that may dissuade certain groups of students from participating

- ○ Strongly disagree (1)
- ○ Somewhat disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat agree (4)
- ○ Strongly agree (5)

Q6 We solicit feedback from our participants about their high impact experience

- ○ Never (1)
- ○ Sometimes (2)
- ○ About half the time (3)
- ○ Most of the time (4)
- ○ Always (5)

Q7 Would you consider a review of the HIP you administer to look for structural issues in terms of equitable access and barriers to participation?

- ○ Definitely not (1)
- ○ Probably not (2)
- ○ Might or might not (3)
- ○ Probably yes (4)
- ○ Definitely yes (5)