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Funding STEM Intervention Programs: Money Speaks Louder than Words

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ABSTRACT

This paper examines the relationship between higher education institutions and Science, Technology, Engineering, and Mathematics (STEM) intervention programs that promote diversity within STEM fields. Specifically, this paper aims to explore institutional commitment to diversity by focusing on funding priorities of colleges, universities, and departments, particularly during periods of economic downturn. To investigate institutional funding of STEM Intervention Programs (SIPs), funding sources and long-term financial sustainability are investigated through forty-seven semi-structured interviews conducted with program directors and administrators at ten large, public, research universities. The findings reveal that without institutional funding, many SIPs struggle to secure corporate and private funding, which in turn threatens the existence of some programs. The findings also suggest that as institutions are forced to tighten their budgets, funding priorities do not usually include STEM-related interventions that seek to serve underrepresented students, including women, minorities, first generation, and low-income students. As a result, intervention programs are forced to reduce or eliminate services provided to underrepresented students. Reduced funding not only affects the scope and nature of services provided by SIPs, but may indirectly result in fewer underrepresented STEM students entering such majors or persisting in STEM to graduation, potentially impacting the diversity of STEM graduate degree programs and the STEM workforce. These findings have great implications given the nation's need for an increase in the number of STEM degrees awarded to domestic students in order to ensure economic and global competitiveness.

INTRODUCTION

In recent decades, there has been a dramatic global shift in the technical innovation and scientific talent from the United States to Asia, which has directly impacted the technological advancements and the global economic leadership of the United States (Taningco et al., 2008). Other trends in education contribute to this decline and threaten the stability of United State's economy further. Recent studies indicate that students in the United States are ill prepared in math and science as compared to other economically developed countries (Taningco et al., 2008). In addition, these trends suggest that the number of U.S.-trained STEM professionals in the fields of Science, Technology, Engineering, and Mathematics (STEM) is inadequate to meet the nation's needs, which is further stressed with the decreased flow of international students studying engineering and science in the United States (U.S. Congress, 2006). Furthermore, the current populations participation rates in STEM are inadequate to respond to the growing number of retiring workforce in the STEM fields. These numbers are further exacerbated given the changing demographics of the United States. Today, minorities comprise the majority of today's college-age population, yet are grossly underrepresented within higher education and especially within STEM majors (Taningco et al., 2008; Milett and Nettles, 2006). Given the importance of postsecondary education as a function of both social mobility and economic productivity, access to a college degree, especially within high-need fields such as STEM, is of national concern.

Of equal importance, issues of underrepresentation in the STEM fields for domestic women, minorities, first generation, and low-income students can be viewed as a waste of human capital and detrimental to national productivity (Smyth and McArdle, 2004; Vela, 2003; Chapa and De La Rosa, 2006). Concerns of equity, diversity, inclusion, scientific advancement, and

workforce preparedness in the STEM fields have also been expressed by the Committee on Equal Opportunities in Science and Engineering (2004). In urgent tones, these reports reinforced the view that in order to produce and maintain a highly-skilled and globally competitive workforce, U.S. colleges and universities need to increase the number of STEM graduates, in general, and the number of degrees awarded to underrepresented populations, in particular.

Given the national concern of increasing STEM participation and developing the human capital among underrepresented populations, factors that contribute to an increase in STEM involvement must be further examined. STEM Intervention Programs are one avenue that have been proven to the success of women, minorities, low-income, and first-generation students. In response to these appeals by the education and business communities, this study investigates how the structure and support of STEM intervention programs (SIPs) reflect a university's commitment to diversifying the STEM fields, and the long-term sustainability of programs that impact the recruitment and retention of underrepresented students in the STEM fields. Details about SIPs and the roles they serve are described in more detail below.

The Context

The current recession presents a number of challenges to institutions of higher education. State budget shortfalls have forced some public research universities to consider and/or implement tuition increases, furloughs, and hiring freezes. The current economic climate has also had a detrimental effect on access and retention for minority, first-generation, and low-income students who may seek higher education as a form of social mobility. In addition to the challenges faced by increasing tuition rates and reduced financial aid opportunities from institutions (Heller, 2002), underrepresented students who seek to enter a STEM major may face additional hurdles. These hurdles have been increasingly examined within the literature in recent

years, including pre-college factors, academic preparation, financial aid, campus climate, departmental and institutional factors, all of which contribute to the “leaky pipeline” (Blickenstaff, 2005 p. 369; May and Chubin, 2003; Hurtado, 2001; St. John et al., 2004; Smyth & Mc Ardle; Cole, year). Less examined topics include institutional factors, such as SIPs and their funding sources, which are of interest in the current study. During uncertain economic times, many public colleges and universities are forced to make difficult decisions regarding the funding of student programming, support services, and staffing, including intervention programs aimed at increasing the enrollment and success of underrepresented students in the STEM fields. This is especially true for sustaining funding of intervention programs that serve underrepresented students (Heller, 2002), which are often add-ons to institutional programming/support service efforts. As a result, students who would benefit most from these programs are negatively impacted, threatening their entrance into and/or persistence in STEM majors.

Many SIPs rely on a wide variety of funding sources to support program personnel and provide services to students. Funding sources may include department, college, and university funds, state and federal grants, alumni donations, and corporate sponsorships. As public universities make difficult budget decisions, the decision to fund, decrease the amount of funding, or discontinue the funding of SIPs becomes a symbol of the institution’s commitment to supporting SIPs and to diversifying the STEM fields. High-levels of institutional commitment to diversity would support the retention of student populations that have been traditionally underserved within higher education and specifically in STEM by funding the SIPs that serve them. While some institutions may emphasize their commitment to diversifying the STEM fields, few institutions provide the administrative and financial support needed to sustain STEM

interventions. In this sense, the actual funding and sustainability of SIPs speaks to the legitimacy of these organizations within institutions, which goes beyond merely claiming to support such efforts. The financial support of the institution allows successful SIPs that may be struggling financially to increase their services to students, allow for a consistent set of services, and allows SIPs to contribute to increasing the number of students and success rates of students in STEM.

In light of calls for diversifying the STEM fields and strengthening the STEM workforce within the United States, research regarding the funding practices and sustainability of STEM intervention programs is needed, particularly as these programs impact students' decisions to enter and remain in these fields.

STEM Intervention Programs (SIPs)

The STEM intervention programs that are included in this study include a variety of approaches that attempt to increase the access and retention of underrepresented students in higher education and specifically within STEM education. Few intervention programs included in this study are solely pre-college interventions, supplemental education programs, academic bridge programs, living-learning communities, research programs, student organizations, mentorship interventions, but are rather a hybrid of multiple intervention components. For example, a single program may include a summer research academic intervention component, where students are encouraged to develop peer support networks and a relationship with their research faculty advisor within a lab.

Historically, STEM Intervention Programs were established to increase access to STEM fields, improve the educational experiences of students who have been inadequately represented within STEM fields including women, students of color, first generation, and low-income students, and contribute to their persistence within STEM (DePass & Chubin, 2008). While

most of the interventions included within this study are housed within department such as engineering, given that these majors have the highest need for increasing the number of underrepresented students, there are also SIPs in majors such as the agricultural sciences, health sciences, and other physical sciences where the rates of women, low-income, first generation, and minority students involvement may not be as dismal. In addition to where the interventions are housed, staffing organizational structure, recipients, and the set of services provided to students vary greatly. In this sense, SIPs do not have a universal design; they are often tailored to meet the specific need of their targeted recipients. Literature on STEM participation and factors that explain success within STEM have analyzed these factors within several theoretical frameworks such as self identity, self-efficacy, and social cognitive career based- theories (DePass & Chubin, 2008), given the nature of this study, however, a more appropriate study is one pertaining to organizations, specifically organizational theories.

Legitimacy

The theoretical framework used to explore institutional funding within SIPs originates from Organizational Ecology, which specifically examines institutional and resource dependency theories that highlight factors of legitimacy. Legitimacy is defined as the process by which an organization gains acceptance by means of its attachment to mainstream norms and values within an institution or society. Weber (as cited in Roth & Wittich, 1978) argues that there are three avenues for establishing legitimacy: through charismatic authority, traditional authority derived from tradition, and rational legal authority derived from laws or customs. As an organization, or in this case an SIP, becomes legitimate it sustains the flow of resources from the environment to the organization (Hannan & Freeman, 1989). Moreover, Parsons (1960) argues that organizations that pursue goals that are in alignment with societal values have a legitimate claim on resources

as judged by stakeholders (Lounsbury & Glynn, 2001). As a result, SIPs seeking legitimacy may be influenced to incorporate structures and procedures that match widely accepted social norms, or norms found within a college or university. As such, SIPs may be encouraged to align their missions and goals with societal values, which has been observed in some SIPs as their mission have changed from providing opportunities to explore the STEM fields to rewarding merit-based achievements in STEM (Walker & George-Jackson, 2010), mirroring the ideological shift in found in some financial aid programs.

As universities are forced to make difficult budget decisions regarding the level of funding (if any) to SIPs, their actions signal the extent to which SIPs are viewed as legitimate entities within the given department, college, or institution. Often times, SIPs are seen as add-ons or unnecessary supplements to the academic institution. Thus, the organizational structure and position of an SIP within the institution may influence the SIPs legitimacy. An SIP that is centrally located within the SIPs targeted department may be seen as a priority and important to the department or college, whereas an SIP located within a diversity office or outside of a department/college that the SIP serves may be seen as less legitimate to upper administrators across the university who have influence over budget priorities. As a result, SIPs desire to be viewed as (or perceived as) legitimate structures. Legitimacy validates the purpose of SIPs as necessary entities within the university, and directly affects the long-term stability and financial support SIPs receive from their college, departments, and the university. As SIPs become legitimate structures within their college and within their departments, they become a priority for funding through “hard funds.” This additional sustainability permits SIPs to have access to adequate staffing, resources, and visibility to successfully run their programs. As such, we see how the link between funding, staffing, resources, and visibility for SIPs is cyclical. As a SIP

gains legitimacy, it is able to be properly staffed and has access to adequate resources, this in turn increases the legitimacy of SIPs.

DATA AND METHODOLOGY

This study is a component of a larger study on underrepresented undergraduate students in the STEM fields at large, public, research universities. Project STEP-UP (STEM Trends in Enrollment and Persistence for Underrepresented Populations) focuses on individual student factors and institutional factors that impact the educational outcomes of women, students of color, and low-income students' participation within the STEM fields. Specifically, the project examines enrollment, persistence, and degree attainment of women, racial and ethnic minorities, and low-income students in the STEM fields through both quantitative and qualitative methods.

This study utilizes the qualitative data gathered in 2009 and 2010. This component of the larger research project sought to examine the design, implementation, challenges of SIPs and how these challenges may directly or indirectly impact underrepresented undergraduate students experiences within STEM. Forty-seven semi-structured interviews with SIP directors and administrators were conducted at ten large, public, research universities. Potential participants were purposefully selected by searching each university's websites for STEM intervention programs targeted toward underrepresented undergraduate students, including women, students of color, first-generation students, and low-income students.

While the specific missions, goals, services, and targeted populations of each program included in the study varies, each aims to increase the enrollment, persistence, and/or graduation rates of underrepresented students in the STEM fields. Examples of SIPs

in the study include, but are not limited to, summer research programs, mentoring and tutoring programs, leadership development programs, and first-year experiences for underrepresented students in STEM (e.g., designated housing, first-year seminars, etc.). Participants included administrators, faculty, and staff of SIPs. A total of 119 individuals from nine universities were invited to participate in the study. Of the 47 participants, 11 were male, 36 were female; 22 were white, 19 were African American, four were Latino, one was Native American, and one was Asian American. On average, interviews lasted approximately one hour, with two interviewers from the research team per interviewee. Interview teams included one principal investigator and one research assistant. Of the interviewees 2 were males and 4 were females; 4 were African American, one was Latino, and one was Caucasian. In addition, a total of 97 documents and reports were gathered from the STEM intervention programs, which included annual reports, survey instruments for evaluation purposes, pamphlets, and brochures.

The interview protocol asked respondents questions pertaining to the history, mission, goals, services, structure, funding, and outcomes of the program they administer or direct (see Appendix A). In addition, interviewees were asked about their own background and responsibilities within the SIP. Questions pertaining to the funding practices, the changing of funding over time, and the structural location of the SIPs are of particular interest in this paper. Interviewees were asked the following questions:

- a) How is the program funded? Does the source of funding impact delivery? If so, how?
- b) What is the level of funding from the college, campus, and external sources? (*Possible probes*: Approximately what percent of support for this program is offered by the university? What are the additional sources of support and what do they cover? Over the

last five years, has the level of support changed and in what direction?) How does the program benefit its internal and external sponsors?

- c) Can you describe the type and level of support of the program from the college dean? Upper-level administrators? Faculty members?

For this paper, researchers utilized an open coding strategy to organize data into broader themes and issues. Open coding is concerned with describing, identifying and categorizing the phenomena of interest (Stauss and Corbin, 1990). Upon development of coding and pattern-matching logic was used to identify distinct characteristics of institutional programs and common themes and issues across all the campuses. Pattern matching logic compares empirically based patterns with theoretical and conceptual frameworks (Yin, 2003).

To reduce concerns for internal validity, researchers examined various sources of data - interviews from participants, observational field-notes and documents (external and internal). This triangulation of data allowed researchers to check data collected through one source (interviews) with data collected through other sources (observation notes; external and internal documents). Additionally, to address reliability, researchers meet periodically to compare data interpretation notes and ensure that conclusions were plausible given the data collected.

DISCUSSION OF RESULTS

The analysis of the interviews revealed several common themes regarding the funding structures of SIPs: 1) changes in funding over time; 2) how funding relates to an institution's commitment to diversifying the STEM fields; and 3) how funding relates to establishing the legitimacy of SIPs. Sub-themes identified included: , the sources of funds, and staffing issues. These sources of funding were found to strongly influence the way the intervention program was

run, the support of personnel, the resources available, and in some instances the existence of the program.

Changes in funding

The funding sources of a number of SIPs included in the study have changed over time. A number of programs which began with grant support are struggling to find continuous funding sources and risk being unsustainable within their institution. Other SIPs were initially supported via “hard funds” through their university, college, and/or departmental budgets, but are now solely supported by “soft funds,” relying on grants, corporate donations, and sponsorships. As college and university budgets become tight and private sources are affected by the current economic crisis, the reduced funding sources given the current economic climate threatens the existence of some SIPs. The effect of reduced funding, particularly when alternative sources do not readily exist to replace reduced or diminished funds, threatens the deliverance of specific programs under a single SIP. As a result, these services may no longer be offered in order to accommodate for reduced expenses or the very existence of some SIPs is at risk. These changes in funding have pressured staff to look for alternative sources of funds.

Sources of funds

Corporate funding of programs

The majority of the participants spoke of the proportion of funding that comes from corporations. One participant indicated that her SIP “receives no funding from state money...all of the funding comes from the industry.” As a result, participants indicated the ongoing need to seek out new funding through grant writing, which directly influenced the resources and services they provided students due to uncertainties within the economy and competition with other programs seeking funding. Furthermore, one participant pointed out that corporate funding was welcomed

but did not always support the types of services needed most: “The corporate funding is repetitive and it doesn’t depend on the results of the program. We given them the results and it doesn’t matter [if the program doesn’t work].” In other cases, corporate sponsorship may have impacted the structure of the program, as industrial corporations dictated the specific services a SIP provides to students (as a condition of their funding). These finding suggests that corporations may not be dedicated to diversifying STEM, but rather more interested in the profile of their corporation, marketing their company in an effort to recruit students as a potential future employees. A reoccurring issue expressed by SIPs that depended on corporate funding was the inconsistency in corporate funding. Program X administrator expressed how when their SIP had a “boat load of money, [they] got a boat load of money [from Corporate funders and] now that they don’t, they don’t.” Because grants come with stipulations, oftentimes programs have to spend the grant money by a certain time so they “spend it fast, without thinking.” Although corporations comprise a substantial amount of some SIPs budgets, it is often inconsistent and unreliable for long-term program delivery and sustainability. SIPs are not the only ones who benefit from corporate donations. Many program coordinators indicated that outside corporations benefitted from having a better selection of students they could hire, specifically diverse teams that will provide innovative talent.

Soft Funds

In addition to program overall funding, participants cited “soft funds” as the biggest impediment to delivering programs and services. Many participants indicated frustration with universities, colleges, or departments who have opted to have SIP staff supported by soft funds rather than commit budgeted funds to support their salaries. Many program administrators indicated they had severe issues with funding, Program Y indicated that “some staff even have to

bring in their own salary.” This task of raising monies to pay for staff’s salaries becomes even more difficult today due to the current economic uncertainty. As SIPs struggle to have access to “hard funds”, the need to find “soft funds” increases which directly influences the priorities of staff who spend an increasing amount of time securing funding and writing proposals for grants. This pressure on staff to secure funding affects the SIPs service delivery and indirectly affects the needs of underrepresented students within STEM.

Another participant indicated that her desire to expand the program had to be put on hold due to budget restraints. Another participant shared that even with the reduction in staffing, the program was still expected to provide the same services: “We used to have a secretary, plus three to five student workers. Now we have three. There used to be more. It all depends on funds. We had a half-time or quarter-time evaluator. There is not one now but I would like us to have one again.”

An intervention program that did have the staff salaries paid for by the state and college depended on fundraising to deliver their intervention. This program was geared towards increasing STEM participation for women. As such, participation within the intervention was not need based, although scholarships were available for qualifying low-income female students. The program coordinator expressed how without support from external donations, program tuition, and corporate sponsorships the undergraduate research program and the freshman camp would cease to exist. Only self-supporting STEM programs would continue. Unlike other programs, the program coordinator felt confident that their SIP was seen as a legitimate investment. Thus, the existence of the SIP was benefiting the college by recruiting women into STEM, providing better educational experiences for female students within STEM, and increasing retention. The source of funding for SIPs has a direct impact on the legitimacy of the

SIP, the SIP geared towards women within STEM had access to some “hard funds” through their respective college, access to “hard funds” facilitated access to additional sources of funding.

College and university funds

Programs supported via “hard funds” often expressed their institution’s long-term commitment to their programs and related diversity efforts. One participant spoke of a campus-wide effort to improve diversity that began in the 1980s and continues today, with funds from the state, university, and individual academic colleges supporting a variety of support service programs that sought to expand diversity, including SIPs.

These programs also spoke of having administrative support and commitment from upper-level administrators on campus. The funding of their programs is seen as a campus priority, and has been sustainable overtime due to the institution’s commitments and funding decisions. Some programs which were funded through their college and/or university acknowledged the hardships of those programs that were on “soft money.” In response to being asked how their program was funded, one respondent replied: “Oh, the Dean. I mean, 100 percent. I have a budget. I’ve had a budget for programming. And I consider myself lucky.” Other programs who expressed the same type of committed, “hard money” support by the dean and other upper level administrators indicated that job security was not an issue that they worried about in comparison their peer SIPs who relied entirely on soft money. Although the SIP did fundraise additional funds to support additional initiatives that they may feel would benefit their students, the participant indicated that it was expected that if they had “an important idea, then the dean should be involved.” This expectation of upper level administrator involvement is directly correlated to the authority and legitimacy of the program in relation to the college or department. Programs that are not lucky enough to have access to “hard funds” that allow for

stability of staffing and program services face having the most basic need being unmet, inadequate staffing.

Effects on staffing and job security

A common trend among the participants was that their programs are severely understaffed. Due to budget challenges and funding restrictions, many participants indicated that they relied heavily on current students and student organizations for volunteers to aid in delivering the program, manage websites, market their programs, and serve as mentors for incoming students. Others shared administrative support staff with other offices in their college. In addition, although directors and administrators described how they would like to expand their programs, they indicated that without adequate staffing, such efforts would be highly difficult if not improbable. Programs that have inadequate support personnel and have failed to receive funding to support much needed support personnel may not be viewed as a legitimate investment.

When universities fail to commit funds to SIPs, not only are the services the program delivers at risk, but so are the jobs of the administrators and directors, and in some cases, the program itself is at risk. Of the nine universities included in the study, one university faced particular hardships with regards to sustainability of their SIPs. Of 11 interviews completed on that campus, two directors indicated that their appointments were not being renewed for the following year due to budget cuts. In both cases, the directors who are losing their jobs represented the entire staff of those SIPs. These participants expressed concerns about the long-term viability of their programs given the fact that the only staff member was leaving. Without institutional commitment not only to the program and the services it delivers, but also to the staff that runs these programs, many SIPs are at risk in terms of longevity and sustainability.

From the interviews, it is clear that overall funding, sources of funding, and (lack of) institutional investment SIPs impact their delivery and sustainability, as well as reflect upon the university's commitment to diversifying the STEM fields via intervention programs.

LIMITATIONS

The present study has several limitations. The institutions where data was gathered represent large, public, four-year, research-intensive, and predominantly white universities. Therefore, the ability to generalize the results to non-peer institutions is limited. Further, the recruitment of potential interview participants was based on a web search of publicly available information on each university's website. As a result, if a STEM intervention program was not listed online, or was not located by the research team members, it was not included in the study. In addition, responses were based on participant self-selection in the study.

The selection of STEM interventions was also limited to those housed within certain STEM fields, particularly Engineering and Computer Sciences where underrepresented undergraduates are most grossly underrepresented. This limitation does not allow for generalizing findings to a broad array of science and math based fields. In addition, the views expressed within the study are solely opinions and observations of the program directors and administrations, and may not reflect the opinions and experiences of students who have or may be participating in the same set of programs. Furthermore, the comments and opinions of SIP administrators and program coordinators are limited to those who were interviewed in the study. These findings may not be accurate or may rely on their own perceptions of how they interpret their understanding of the funding practices of the SIPs.

IMPLICATIONS AND CONCLUSION

Findings from the study reveal that institutional funding priorities for intervention programs often do not correlate with the nation's need to increase the number of STEM degrees awarded to domestic students and particularly underrepresented students within STEM. As institutions pay lip service to diversity initiatives, upper-administrators level of support and funding practices of SIPs send a different message. Programs that have been historically created to address a dire need are scrambling to stay afloat. As large, public, research universities fail to fulfill their mission of expanding access to traditionally underserved populations within STEM, the message that equity and diversity is important is called into question as a result of actions or inactions. This study argues that SIPs seek legitimacy from their departments, college, and institutions in order to secure the financial sustainability of their programs that enable large, public, research universities to not only expand access, but contribute to the number of students pursuing a career within the STEM workforce.

In the current economic climate, STEM Intervention Programs (SIPs) are struggling to secure institutional, corporate, and other private funding. Reduced funding has a direct influence on the students served, services provided, and the very existence of some SIPs. Policy implications include providing incentives to corporations and private funders that invest in diversifying STEM higher education and the workforce. Furthermore, SIP-Industry partnerships may be established with corporations who may seek to diversify their workforce and may use SIPs as recruitment tools.

SIP programs may also seek to make administrative internships available to help meet the need of inadequate staffing in order to continue delivering the same resources with limited funding. Internships can be targeted to certain colleges, such as Education colleges with higher

administration degrees and evaluation. Access to interns would allow for successful SIPs to adequately provide their services with proper staffing and prepare future generations of SIP administrators. Furthermore, the evaluations conducted can improve the services provided, provide data needed to secure additional outside funding, and increase the legitimacy of their entity by providing evidence of the impact of SIPs. In addition to internships, partnerships with student professional STEM student organizations may allow SIP program administrators and coordinators to have access to underrepresented students in STEM who may serve as role models and student academic mentors without additional financial burdens. However, administrators are cautioned that reliance on undergraduate students should be monitored as to not burden or distract students from their own success in college.

Further research is needed to determine how staffing and the credentials of the program coordinators and administrators may benefit or impede an SIPs legitimacy, particularly from the perspective of the college or university. Furthermore, more information is needed to examine how structural location of SIPs (i.e., within departments, within a college, or at the campus level) may directly influence funding. Policy implications include the need to emphasize the importance of SIPs in contributing to STEM retention. As such, the need for internal and external evaluations of SIPs is necessary. Through evaluations, SIPs have access to data that can not only serve as a function to improve the services provided by their SIPs and the impact of their SIP on students, but establishes their legitimacy as stakeholders within a college or department. This is directly associated to Weber's avenue to legitimacy through authority, where SIPs not only gain authority as legitimate stakeholders, but have evidence to provide to upper level administrators that their program is benefitting the college, department, and students. In addition to evaluations, a set of SIP best practices are needed, including structural and funding

best practices for institutions housing SIPs. Future research should include an examination of differences among gender focused SIPs and minority serving SIPs is needed.

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Appendix A

STEM INTERVENTION PROGRAMS: INTERVIEW SCRIPT AND QUESTIONS

Participant
Code

Site Code

Consent
Form
Received

Contact
History
Log

We are traveling to several large, public, research universities this semester in an attempt to better understand how STEM intervention programs are designed, how they operate, and why these programs are successful. In this interview, we would to ask you some questions about how the STEM intervention programs that you are involved with operates on your campus and how you view its effectiveness. May we proceed? May we record this interview?

I previously sent you a voluntary consent form by email. Did you have a chance to review it? Do you have any questions regarding this form before you sign it? (COLLECT SIGNED CONSENT FORM) If you have any concerns after the interview, you may contact me to request that the interview be erased or removed from the data collection. In the event that this happens, we will of course honor your request and remove your interview from the data collection.

Allow me to begin with a brief preview of what the interview will cover. We will be discussing STEM intervention programs and their design, implementation, impact on students, and their benefits. We are particularly interested in how these programs operate at large, public, research universities such as this one.

We will use this information, along with data on the program interventions, to ultimately illustrate how such programs are designed, implemented, change over time, and impact underrepresented students in the STEM fields. If at any time, you feel that these questions could be answered by any reports or evaluations you have conducted on the program, please feel free to refer us to those documents.

Please remember that your participation in this interview is completely voluntary and that any information you provide will be confidential. As a reminder, this conversation is being recorded

and following the transcription of our conversation, the digital file will be destroyed. All identifying information will be kept confidential. Do you have any questions before we begin?

[Start recording]

BACKGROUND INFORMATION:

We'll begin with a few introductory questions.

1. How long have you worked at this institution? How long have you been in this position?
2. How long have you been involved with _____ [name of the program]? What are your specific duties in your current position? Have you worked with any other STEM programs at this institution or any other institutions? If so, which ones?
3. I'd like to ask you a few questions about your background and expertise:
 - a. What is your educational history? Do you have a background in STEM?
 - b. What was your work experience prior to your current position?
 - c. What made you choose to enter this type of work (in your current position)?
 - d. How do you keep current with the research that addresses the work you do in this program?

HISTORY AND GOALS OF THE PROGRAM:

I'm now going to ask you a number of questions regarding the history and goals of the program.

4. Can you tell us a little bit about the program? For example...
 - a. When did the program begin?
 - b. Why was the program developed? What prompted the program's creation?
 - c. What is the mission or primary goals of the program?
 - d. How is the program structured?
 - e. What specific services does the program provide? (*Possible probe:* For example, does the program offer academic or mentoring services?)
 - f. What ideas guided the design and implementation of the services offered in the program? (*Possible probe:* Did you see that students needed better opportunities for mentoring, a need to improve the climate in order to improve persistence, etc.?)
 - g. Has the goal or the mission of the program changed since its inception, and if so, what precipitated the change?

I'm now going to ask you a number of questions specifically about the students the program serves.

5. What population of students do you serve or target?
 - a. How do you recruit prospective students to participate in the program?
 - b. How do you determine eligibility?
 - c. How do you advertise the program?

- d. What types of students are most likely to take advantage of the resources offered by the program?

STRUCTURE AND SUPPORT OF THE PROGRAM:

I'm now going to ask you a series of questions regarding the organizational structure and support of the program.

6. Where in the administrative structure of the college or campus is the program located? Has it always been located there?
7. How might the organization of the department or college impact service delivery?
8. How is the program staffed? (*Possible probe:* If the program staff includes student workers: Are the student workers enrolled in STEM majors? What is the diversity of the student workers in terms of gender, race, ethnicity, and economic background?)

I have a few questions on how the program is supported, both the financial support of the program and other expressed forms of commitment.

9. How is the program funded? Does the source of funding impact delivery? If so, how?
10. What is the level of funding from the college, campus, and external sources? (*Possible probes:* Approximately what percent of support for this program is offered by the university? What are the additional sources of support and what do they cover? Over the last five years, has the level of support changed and in what direction?) How does the program benefit its internal and external sponsors?
11. Can you describe the type and level of support of the program from the college dean? Upper-level administrators? Faculty members?
12. What are the forms of collaboration with other units and/or faculty members on campus that the program benefits from? (*Possible probe:* Are there units with which you share resources, staff, courses, etc.?)

OUTCOMES OF THE PROGRAM:

The following questions are related to outcomes of the program. We are interested in determining how well the design of the program meets its stated goals and the needs of the students.

13. Does the program meet its mission and stated goals?
14. How successful is the program at achieving its stated goal(s)? By what criteria is success determined? To what do you attribute its success or lack of it?
15. Has the program been formally evaluated (i.e., internally or externally)? What was the focus of the evaluation and what were the results? Would you be willing to share a copy of the evaluation(s) with us?
16. What do you see as the immediate and long term impacts of this program on students? (*Possible probes:* Why do you feel that this program is beneficial to students? How do you feel that this occurs? How do you measure the impacts?)

17. What component(s) appear to be most beneficial and useful to students? Why?
18. Do you follow-up with program participants after receiving services? For how long and how frequently?
19. Have there been any modifications or adjustments to the program? If so, how has the program changed? What informed these changes? (*Possible probes*: Did you collect and analyze data, conduct focus group interviews, or gather any other data that informed your decisions? In other words, were these modifications based on research?)
20. Is there is an area of the program you would like to expand or improve upon? If so, what would it be?

WRAP UP

Thank you very much for your time. At this point...

21. What else is important for us to understand about the operation and impact of your intervention program on your campus?
22. Is there anything else that you would like to add regarding your intervention programs?

Thank you for sharing your time and perspective. Please feel free to contact us if you have any further questions (*give participant business card*). We appreciate all of the information and insight you've provided and know that your answers will be very helpful in our research project.

[Stop Recording]

INTERVIEWER COMMENTS / IMPRESSIONS / SYNTHESIS