BOARD # 456: Strengthening the Artificial Intelligence Workforce: Developing an AI Certificate and Computing Identity at a Hispanic-serving Community College Through an NSF DUE/HSI Grant

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The rapid expansion of the computing field creates a continuous demand for skilled computing workers. However, there is a dearth of postsecondary students in computing majors in comparison to that demand, and the field lacks the diversity present in the U.S. population. This project, funded by the NSF DUE/HSI Program, developed artificial intelligence (AI) courses and a college credit certificate that has attracted a diverse group of community college students to AI, built interest in the field, and resulted in the development of a 4-year degree program at the host institution. Increasing capacity to attract and train students in AI serves the national interest by developing technical talent and capacity in a fast growing field, and the Hispanic-Serving Community College (HSCC) context makes the learning accessible to more students as both Hispanic Serving Institutions (HSIs) and community colleges(CCs) are some of the nations most diverse educational institutions. This collaboration between the community college, university and industry partners, a non-profit organization, and social scientists attempts to more fully understand how to implement, assess, and expand computing pathways for a diverse group of students, especially in the CC context.

One of the primary objectives for the project was to develop and implement an interdisciplinary AI certificate, which was completed at the HSCC. As the program matured, two college credit certificates were developed. The first certificate is the AI Awareness Certificate, where students had to take both the AI Thinking and AI Ethics course, and choose either an AI Business class or AI Robotics course. The Artificial Intelligence Practitioner certificate shares the AI thinking and ethics courses and requires four additional technical courses including Introduction to Python, Introduction to Machine Learning, Introduction to Natural Language Processing (NLP), and Introduction to Computer Vision. Starting in the first years of the certificate course offerings, which were aligned with the AI Awareness Certificate, the research team has conducted a phenomenological study using computing identity development theory (Lunn et al, 2021; Rodriguez et al., 2022) and Hispanic-Servingness frameworks (Garcia et. al., 2019) to inform semi-structured interviews with students. Through the first 3 years the team interviewed 35 students from a range of majors (i.e., data analytics, cybersecurity, and philosophy) and various background demographics (i.e., race, ethnicity, age, nationality, socio-economic status). The research team hopes to complete 75 or more interviews in total by the conclusion of year 4.

Findings from the early interviews show that students pursued computing education for career advancement with their current employers or within the same field, while others were re-skilling in hopes of a career change. Students applied their new-found computing skills in personal projects, their small businesses or their jobs, and they expect those skills to assist them in future employment. Finally, throughout the coursework, students were often affirmed in their interests and provided opportunities to build computing identity by demonstrating knowledge from course content. Several participants provided examples of using course content to implement tangible cost savings for their employers. We found that students were recognized by their family, friends, and coworkers as computing people, and these support systems reaffirmed their learning, aspirations, and identities within computing. In several cases our participants expressed recognition from others that exceeded their own self recognition as computing people.

In addition to work in prior years highlighting student motivation for pursuing the certificate and applications of their newly developed skills and computing identities, in the final year of the grant we have continued to examine participant experiences using various social identities and new analysis frameworks. We have explored the experiences of men of color using the socio-ecological outcome model (Harris and Wood, 2016). However, while prior work emphasized how men of color often attribute their success to women (Sáenz et. al, 2020) and limited help-seeking (Rodriguez et al., 2021), our current study emphasized mentorship from other men as well as a high level of help-seeking. We also studied Hispanic-servingness using Garcia's (2019) servingness framework. Studentsexpressed that structures for serving were present in student supports and were validated by the heavy presence of Latine students in the community and the institution, but did not describe servingness intentionally targeted towards Hispanic students. Other work this year investigated how institutional practices interacted with students' social identities to create barriers to computing identity development using Lunn et al.'s (2021) computing identity framework. This work uncovered how unclear expectations in relation to scheduling, financial obligations, and pre-requisite knowledge inhibited identity development, especially for post-traditionally aged and low-income students. The combined findings in this most recent work, which include all research participants since the beginning of the project, highlight the need for intentional HSCC servingness and consideration of the various social identities (i.e. Latine, men of color, working full time, low income, post traditionally aged). These student characteristics are more frequently found in community college students than they are in typical 4 year institutions (Ma & Baum, 2015; Mountjoy, 2022), and must be considered to meet the goals of making the courses accessible and beneficial. The findings are significant in thinking about how the HSCC AI certificate is structured as well as its delivery to students.

The research team is contemplating several areas for additional study when the final year of data collection is complete. Now that a number of students have completed the certificate, we hope to prioritize completers in upcoming rounds of data collection. One such topic under consideration is comparing experiences of domestic and international students. While we did not make this a focus while developing the interview protocol, the research team noted a significant number while analyzing data. Another potential study is the effects of mixed class participants, where students with minimal computing experience share courses with experienced computing workers shifting their focus towards AI. As was the case with our prior work, the research team intends to maintain an institutional focus, reinforcing the responsibility for colleges and universities to prepare themselves for the characteristics of their students to improve diversity in the computing field instead of expecting these students to change themselves to fit the institution's historical practices.

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