

Work In Progress: Understanding Servingness for Minoritized Students in Introductory Computing Courses at a Hispanic Serving Community College

Dr. Sarah L Rodriguez, Virginia Polytechnic Institute and State University

Sarah L. Rodriguez is an Associate Professor of Engineering Education and an affiliate faculty member with the Higher Education Program at Virginia Tech. Her engineering education research agenda centers upon engineering and computing identity development of historically marginalized populations at higher education institutions. Currently, Dr. Rodriguez is involved with several large-scale interdisciplinary research projects focused on institutional environments and STEM identity development are sponsored by the National Science Foundation (NSF) and the Kapor Center. In recent years, she was selected as an Early Career Awardee and Faculty Fellow with the American Association of Hispanics in Higher Education (AAHHE) and a NASPA Emerging Faculty Leader. She also received the Barbara Townsend Early Career Scholar Award by the Council for the Study of Community Colleges (CSCC) and gave the distinguished ASHE-CAHEP Barbara Townsend Lecture. To learn more about her current projects, visit <http://sarahlrodriguez.com/>

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Antarjot Kaur is currently a Ph.D. student situated in the Engineering Education Department at Virginia Polytechnic Institute and State University. Antarjot has received her B.S. and M.S. in Bioengineering from George Mason University with specialization in Medical Imaging and Devices. Her research interests include broadening participation in engineering, engineering pedagogy, and developing career pathways for engineering students.

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Taylor Y. Johnson is a graduate student at Virginia Polytechnic Institute and State University (Virginia Tech) pursuing a Ph.D. in Engineering Education, where she serves as a graduate research assistant. Taylor earned her Bachelor's degree from The University of Texas at Austin in Biomedical Engineering. Taylor previously served as a member of the student support staff for the Virginia Tech Center for the Enhancement of Engineering Diversity (CEED) where she served as an instructor for the first-year professional development seminar and as coordinator for the summer bridge program. Her research interests include equity in engineering education, middle-years of engineering, and engineering student support for post-traditional students.

Understanding Servingness for Minoritized Students in
Introductory Computing Courses at a Hispanic-Serving
Community College
CoNECD 2025

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Good [Insert time i.e., morning, afternoon, or evening]! Today we'll be focused on understanding servingness for Minoritized students in Introductory Computing Courses at a Hispanic Serving Community College.

Research Team



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My name is

- 1) Antanjot Kaur and I'm a second year Ph.D student situated in the Engineering Education department at Virginia Tech
- 2) Paul Bigby and I am also a second year Ph.D student situated in the Engineering Education department at Virginia Tech
- 3) Taylor Johnson and I'm a Ph.D. Candidate situated in the Engineering Education department at Virginia Tech
- 4) Dr. Sarah L. Rodriguez and I am an Associate Professor situated in the Engineering Education department at Virginia Tech

Partners

This project has a team of community college, university, company and non-profit partners collaborating for the implementation of the certificate program.

Institutional Partners



Company and Non-Profit Partners



Before we get started today, we'd like to thank the collaborators across industry, government, and academia who have made this project possible.

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- Artificial Intelligence For All: A Framework for a College Certificate (Award #2115153)
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- Antonio Delgado (PI), Diego Alvarado (Co-PI) Sarah Rodriguez (PI), Joseph A Weathers (Co-PI)



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Agenda

- Project Context
- Background
- Servingness Activity & Defining Servingness
- Theoretical Framework
- Methods and Participant Selection
- Let's Search For Servingness
- Takeaways
- Implications & Future Work

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So, now that we know who everyone is, in this presentation we'll go through the:

- 1) Project context as this study is a part of a bigger NSF grant
- 2) Background on concepts relative to understanding this project
- 3) An activity on discussing Servingness
- 4) Discussing the actual study (Theory & Methods)
- 5) Activity on Servingness
- 6) What we can take away from today
- 7) And how we can move forward from this study with implications and future work

Project Context

- Four-year NSF DUE & HSI funded Program aims to develop:
 - **AI AWARENESS CERTIFICATE:** A series of artificial intelligence (AI) courses
 - An interdisciplinary certificate focused on AI concepts
 - Foundation for a four-year degree in AI at the college
 - In final year for the grant

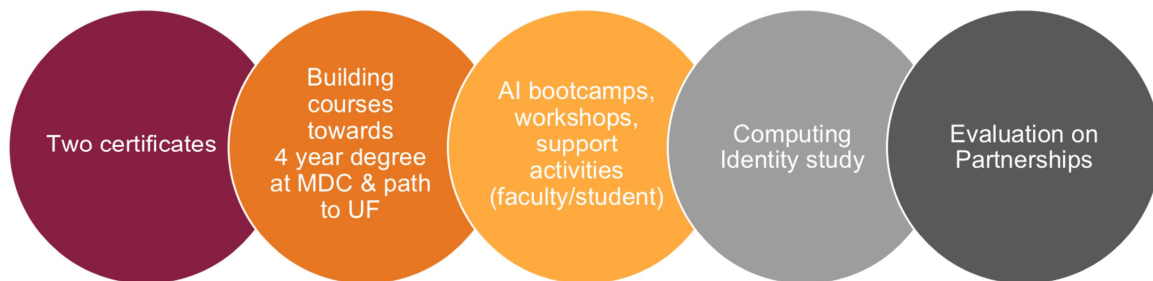
This project aims to serve the national interest by increasing community colleges' (CC) capacity to attract and train students in AI.

The focus of the four-year NSF DUE & HSI funded Program is to develop artificial intelligence (AI) courses and an interdisciplinary certificate for college students to gain exposure to AI concepts. Additionally, the development of the certificate program will lead to the development of a four-year degree in AI at the college.

This project aims to serve the national interest by increasing community colleges' (CC) capacity to attract and train students in AI. We are currently going into the Grant's final year

Program Context

The program takes place at Miami Dade College, and has a few key objectives and project activities:



The program takes place at a Hispanic serving community college [HSCC], and has a few key objectives:

- AI certificate with two pathways
 - 1) The first pathway is the AI Awareness certificate that aims for people who are interested in knowing more about AI
 - 2) The second pathway is the AI practitioner College Credit Certificate that aims for people to be able to think, use, and develop a skillset around the application of AI
- Creating a pathway from Certificate to MS for students interested in AI
- Coordinating mentoring and support activities to build engagement
- Study around professional identity development
- Thinking about partnerships with different stakeholders

College Credit Certificate (CCC) in Artificial Intelligence Awareness

AI Thinking	AI & Ethics	Applied AI in Business	Introduction to Robotics
<ul style="list-style-type: none"> • AI and digital competency • Concepts and ethical concerns around AI • Basic understanding of coding, Python, and machine learning • Pilot: 2021-2022 (EnTec) 	<ul style="list-style-type: none"> • Ethics as relevant to the design, implementation, and administration of artificial intelligence and emerging technologies • Biases of algorithms, autonomous warfare, the risks of surveillance technologies, and the effects of technologies on employment • Pilot: Spring 2022 (Philosophy) 	<ul style="list-style-type: none"> • Applied AI in industries and across business functions to support business strategy formulation, implementation, and evaluation • Data-driven outcomes and Ethical issues • Pilot: Spring 2022 (Business) 	<ul style="list-style-type: none"> • Demonstrate an understanding of robotics and the history of robotics • Basic robotic programming skills • Develop an understanding of input (sensors) and their functions in a robotic system • Understand output devices and their functions in a robotic system • Pilot: Fall 2024 (robotics)

As those two pathways that were discussed in the previous slide originated from a 9-credit College Credit Certificate Artificial Intelligence Awareness shown here. The CCC includes AI Thinking, AI & Ethics, and one elective (Applied AI in Business or Introduction to Robotics).

For the purposes of this study, the data that was collected for this study includes the AI Thinking, AI Business, and AI Ethics course. We plan on doing data collection of those who have taken the Introduction to Robotics as well that will be included later as this is still a work in progress.

Background

Minority Serving Institutions (MSIs):

- Institutions designated based on minoritized racial population
 - Asian American Native American Pacific Islander Serving Institution (AANAPISI)
 - Historically Black Colleges and Universities (HBCU)
 - Hispanic Serving Institution (HSI)
 - Tribal Colleges and Universities (TCU)
- Hispanic Serving Institutions (HSIs) are the fastest growing and are the most common MSI designation in the U.S.

According to the U.S Interior, a Minority Serving Institution(MSIs) can be defined "are institutions of higher education that serve minority populations".

MSIs can include AANAPISI, HBCU, HSI, and TCU that aim to serve the Asian American, Native American, Pacific Islander, Black, and Latinx communities.

The designation is given based on the institution having a quota population at the institution. Hispanic Serving institutions are the fastest growing and most common MSI designation given across higher education institutions within the nation.

Background

Hispanic Serving Institutions designation = 25% of student body is Latinx

- Hispanic Serving Community Colleges are key access point:
 - As they are both a Community College and Minority Serving Institution
 - Are magnets for other minoritized groups other than Latinx students

Hispanic Serving Institutions can still have a majority non-minoritized students and retain white dominant culture

Currently, HSIs require that 25% of the student body identifies as Latinx. Hispanic Serving Community Colleges are key access points for the Latinx community as both HSIs and Community Colleges are key access points to higher education.

These institutions are designated to serve Latinx students, but also enroll a diverse body of minoritized students as well. By serving these students, it is not only promoting a diverse student bodies success, but also developing an ideal place from which industry might find a diverse pool of computing graduates. However, servingness is not clearly defined similarly across institutions. Institutions also make many of these decisions at higher levels and it is unclear of if it makes it into the students day to day educational experiences. Also, it is unclear if the institutions initiatives to serve the students is able to cater to minoritized students as institutions that are classified as MSIs may also still remain Primarily White Institutions that perpetuate exclusionary culture towards minoritized groups within an institution that is designated to serve them.

Let's discuss Servingness

Mentimeter Question:

- What do you think of servingness?
- How do you see servingness enacted at your own institution?

Poll & Response

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Take mentimeter poll, validate the examples given by participants, and point out even though all answers were valid “there is variation within the way we all see servingness within this room, so we can only imagine how do several institutions define servingness and evaluate it?”

Defining Servingness

What is Servingness?

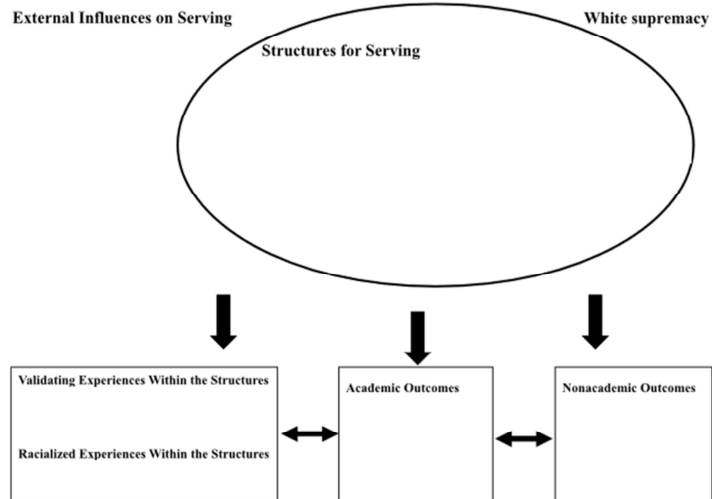
- Garcia et. al discusses:
 - complexity of defining servingness
 - lack of federal infrastructure for implementation
 - Created a framework to explore servingness

Discuss how gina garcia et. al talks about servingness, the struggles, and transition into how garcia et al created a framework to explore and define servingness through the framework we will be talking about in the next slides

Theoretical Framework

Garcia et. al created a framework that examines servingness through:

1. External Influences on Serving
2. Structures for Serving
3. Validating Experiences within the Structures
4. Racialized Experiences Within the Structures
5. Academic Outcomes
6. Non-Academic Outcomes
7. White Supremacy



Garcia et. al created a framework that examines and explores how servingness appears through 7 categories to examine and define servingness.

Theoretical Framework

External Influences on Serving:

- Legislation
- Boards
- External groups and personnel

External Influences on Serving

Federal legislation
State legislation
Local legislation
Institutional governing boards
State governing boards
Advocacy groups
Community leaders
Alumni

Structures for Serving

White supremacy

Validating Experiences Within the Structures

Racialized Experiences Within the Structures

Academic Outcomes

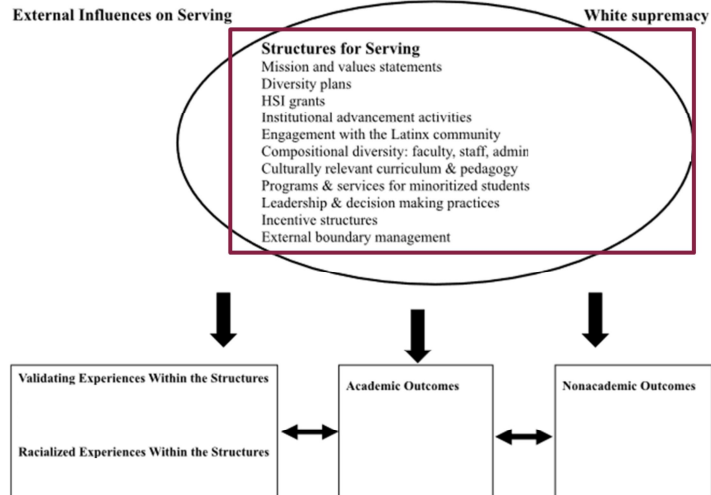
Nonacademic Outcomes

The first category examines external influences including legislation and policy, governing boards external or at the top of the institution, and other personnel that may impact the servingness at that institution

Theoretical Framework

Structures for Serving:

- Organizational structures
- Local Community engagement
- Institutional plans, ethos, and funding
- Leadership and employees



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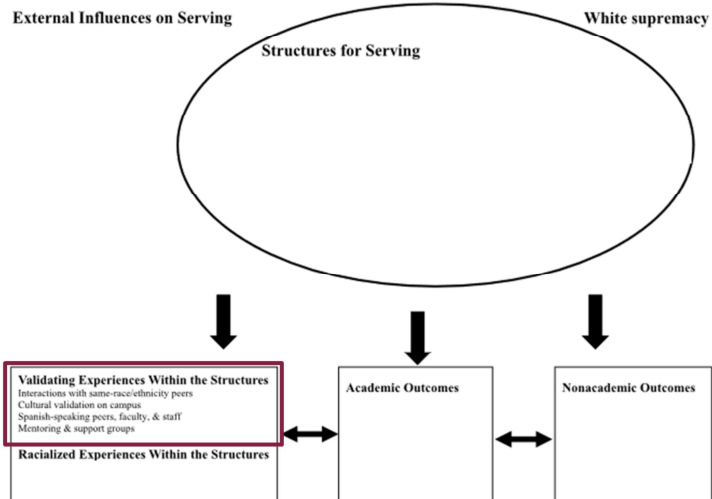
Structures for serving discuss the internal organizational dimensions

- Institutional plans, ethos, and funding
- Leadership and Employees
- Engaging with the local community within the institution

Theoretical Framework

Validating Experiences within the Structures:

- Cultural Validation on Campus
- Spanish-speaking peers, faculty, and staff
- Mentoring & support groups



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Validating Experiences:

- Discusses how students receive:
- Cultural validation
- Speak and implement language between peers, faculty, and staff
- Look at supports such as mentors & support groups

Theoretical Framework

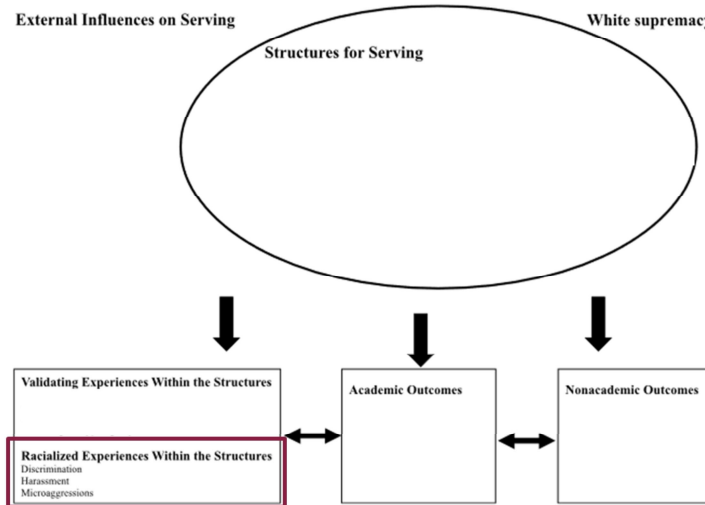
Racialized Experiences Within the Structures:

- Discrimination
- Harassment
- Microaggressions

External Influences on Serving

White supremacy

Structures for Serving



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Racialized Experiences Within the Structures refers to any negative experiences that one may incur due to their racial identity that connect with larger systems of oppression

Theoretical Framework

Academic Outcomes:

- Metrics
- Completions
- Goals

External Influences on Serving

White supremacy

Structures for Serving

Validating Experiences Within the Structures

Racialized Experiences Within the Structures

Academic Outcomes
GPA
Course completion
6-year graduation
College completion
Transfer
STEM degree completion
Post-bac enrollment
Labor market outcomes

Nonacademic Outcomes

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Academic outcomes refer to any outcomes that are related to their course work, degree, or future career such as:

- Metrics
- Completion
- Future Goals

Theoretical Framework

Non-Academic Outcomes:

- Belief system
- Identity Development
- Dreaming

External Influences on Serving

White supremacy

Structures for Serving

Validating Experiences Within the Structures
Racialized Experiences Within the Structures

Academic Outcomes

Nonacademic Outcomes
Academic self-concept
Social agency
Racial identity
Leadership identity
Critical consciousness
Social justice orientation
Civic engagement
Graduate school aspirations

Non-academic outcomes are still outcomes that pertain to one's belief system, identity development, and other life choices

Theoretical Framework

White Supremacy

External Influences on Serving

Structures for Serving

White supremacy

Validating Experiences Within the Structures
Racialized Experiences Within the Structures

Academic Outcomes

Nonacademic Outcomes

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The belief system and cultural values of white centered and colonial culture. It is important that we look at white supremacy as it counteracts the servingness structures as a layer of adding exclusionary culture and multiple layers of oppression based on a minoritized students intersectional identity within an environment that is designated to serve them.

Research Design and Participants

- Students from various majors from ages 20-50+
- 60 - 90 minute interview with each student
- All students are taking one of the first three AI courses
- Focus is on Minoritized students (i.e., race, gender, post-traditional, etc.)

Name		Gender	Age	Latino/Hispanic	Ethnicity/Race
Mia		Female	50+	Yes	White Latinx
Maya		Female	30-50	Yes	White Latinx
Natalie		Female	Under 30	No	Asian

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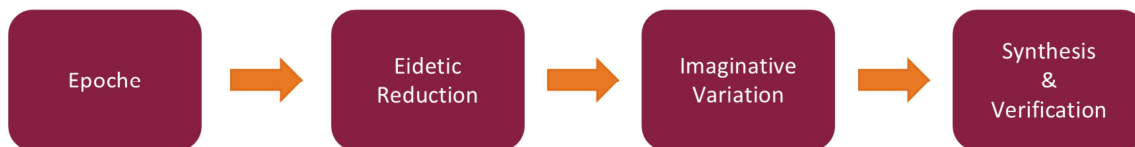
- Students from various backgrounds who were taking one of those three courses(AI Thinking, Applied AI in Business, and/or AI & Ethics and fit within the minoritized category were asked questions about their experiences through 1 60-90 minute phenomenological interview.
- We asked questions around their demographics, their computing identity experiences, and servingness. Such as:
 - Did you know that MDC is a Hispanic-serving community college?
 - What does being at a Hispanic-serving community college mean to you?
 - How do you see Hispanic-servingness show up in the AI4All course? Outside of this course?
- We sampled 19 people, but will focus on the experiences of three students relative to our findings

Methods

Coding and Trustworthiness Exercises



Data Analysis Process



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In order to establish trustworthiness, we went through multiple rounds of coding, memoing, and exploring our own positionalities relative to the research

- (1) Epoche
- (2) Eidetic Reduction - The essences
- (3) Imaginative variation - Looking at different influences and perspectives
- (4) Synthesis & Verification - Synthesizing the essences and verifying using supporting data

Findings

- Validating Experiences Within Structures
- Academic Outcomes
- Lack of Hispanic-Servingness

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Now as we move onto our findings, we'll discuss how students had Validating Experiences Within Structures, their academic outcomes, and seeing the lack of Hispanic-Servingness

- Be explicit about mentioning in the next three slides we will mention these three findings

Preliminary Findings: Validating Experiences Within Structures



Maya: “They have **monthly sessions about what is new in AI**, a guest speaker, or something like that. And then they had invited us one at North Campus for that. And they're going to have another speaker event. I think it's in December. And then they have a little pizza party. But they're trying to not only do the class but also **do these community things** know they're also open to the community, but the fact that they facilitate it, they're-- so I like the fact that it's available for the community, and they push the training a lot. **So if you feel backed up in a corner as far as training, after 20 years, then they're like, "There's a whole community of people that you're not even aware of."** And the one very positive thing [at class?], **I like the TA, that she was available or that she was available for the class for assistance.** So she said she was going to be in her office hours. She did really help or try to help you and try to understand, not just fluff up with a "Oh, yeah, go look on Google. Do this." She did really, really try to help our group”

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- The main finding was that we saw validating experiences within the structures. Validating experiences within the structures can include cultural validation, speaking and implementing language between peers, faculty, and staff, and mentoring from either peers, faculty, and staff. These experiences occur within the institution.

In this example we see Maya, who is a Business intelligence major trying to reskill, discusses how she was able to have validating experiences within structures through support from local community members brought into MDC. We see that students are served through different community members that were brought into the classroom to help students navigate their careers, aspirations, and classrooms. These aspects validate student experiences and support their ability to continue with their AI/computing careers, aspirations, and positive classroom interactions. This is particularly important

at an HSCC because it is a key access point for minoritized students in a uniquely more diverse space. It is significant within an introductory computing class because computing is known to have extremely exclusionary culture and introductory classes are key points where students leave the major.

Preliminary Findings: Academic Outcomes



Mia: **I have my own that I want to run for the company.** The customer sentiment, if I have all the customer service logs and all the Instagram comments and all that, how do I pull it out and how do I see that? They were saying that there actually-- I sent it to my boss and told him, "No, see everything that you have." Because **we worked with** [inaudible], that it's **analytics, a business analytics**, and that's how I do the forecast. And it gives us all the **information**. And that's in that sense. But then they have the customer service. That they **analyze** all the **complaints** or the **problems** that we're having **with the shared product**, I told them, what about if we have-- we don't have records of all the complaints that we're having? And all the replacements that were given, I mean, if the problem is quality, let's go into it what is the problem with the quality? Is it the flower? Is it the package? **We get a look into it, try to fix the problem, but we don't have that. So you want to have something that collects all that information and will give you, "Hey, this is a spike," or "These are the top five problems. This is how much money you're losing in replacement," right?**

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- The main finding was that we saw was academic outcomes. This can include metrics, completing academic milestones, and other academic goals including labor market outcomes.

In this example, we see Mia, who is a first-generation student above 50, the AI Business class helped Mia see how AI connected with her business dreams and as a result an academic outcome of the course was utilizing her new attained knowledge with AI could propel her entrepreneurial aspirations. The AI Business course discussed applied AI in industries and across business functions to support business strategy formulation, implementation, and evaluation. This classroom gave her space to not only learn about AI, bridge the gap between her major and passions. The classroom was able to act and serve as a space that tugs on the interdisciplinary aspect of AI and use it in creative ways that bolster the academic outcome of her career aspirations in the form of labor market outcomes. This is important at the HSCC as computing culture is a "brotopia" and centered in STEM that may not have given a student like Mia the space to understand the content and create the connections between her interests and the computing field that we see in this classroom is helping in developing her future career aspirations in that help in her valuing the class and connecting her interests to a future labor market outcome.

Preliminary Findings: Lack of Hispanic-Servingness

Natalie:

Interviewer: What is being a Hispanic-serving community college mean to you?

Natalie: It mean to me there's a lot of Spanish people in Miami. Also the only give opportunity to Spanish people.

Interviewer: Did you see anything about serving Hispanic students in your class?

Natalie: Yeah. I saw a lot of the teacher, but the teacher are Spanish. That's what I see.

Interviewer: What about outside of the class?

Natalie: Well, there's a lot of Spanish restaurants, Spanish talking.



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Through the constructs of the theoretical framework, we noticed that many of the students were not aware of hispanic servingness, the designation, and only described compositional diversity when prompted about describing hispanic servingness. While servingness is present implicitly through the academic experiences and validating experiences within structures, it is not explicitly understood or vocalized by students. It is important that students are informed and able to understand and articulate the ways they are being served to clearly identify that they are being server, how they are being served, and to receive feedback on how they can be better served.

In this example, we see that when approached with Hispanic Servingness, a young asian woman, students were met with surface level answers that did not align Garcia et. al. We were looking for mentions of one of the servingness constructs. However, when prompted about being aware of the HSCC designation, the student mentioned the demographics of the local population. So, while we have seen other types of servingness, there is a miss when it comes to the Servingness that comes within the HSI designation that is not present or impactful and taking into consideration Latinx students that anyone from that community or external to the latinx community, but internal to the HSCC community sees. It is important that if the main population that the Hispanic Serving Community College is supposed to serve, is served and recognized by both that community and those attending the institution who are allied

in supporting that community as well as can also be positively impacted as well. It is significant to the introductory computing course as it is the first course that they take in computing that sets the tone for the way the students may feel about the major or class and continuing/persisting through it.

Summary

- From this study, we begin to understand servingness and how it shows up in the experiences of students
- HSCCs can see if there is the presence of servingness, how it presents to students, how to apply it, and where gaps in servingness may appear to their own institutions.
- We need more cultural considerations for Hispanic specific servingness

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So, from our findings we can understand serving and how it shows up, how to apply it within the HSCC context, and to take into consideration the cultural aspects that are needed to serve students.

Activity: Identifying Servingness

- Now that we've gone through some of the findings, let's Identify Servingness!
- Each group will be given an excerpt and identify what types of Servingness are present
- Pick one person to be the voice of your group when we come back together!

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- Give quotes that align with different types of servingness and divide into groups then regroup to go over the answers
- 7 groups where each quote represents an aspect of servingness

Takeaways

- What is Servingness?
- Why is it important to understand and define Servingness?
- In what forms did we see Servingness?
- Why is this important at HSCCs

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- Servingness can be seen to be defined by these seven constructs and their subconstructs
- It is important to understand and define servingness to ensure students are served and the institutions are being held accountable and have a reference of servingness
- See the audience as they answer different forms they saw, validate their answers, and move forward
- It is important at HSCCs because they are becoming more popular and are key access points to higher education for students within the latinx community and minoritized outside of the latinx community.

Implications & Future Work

Implications

Cultural specific and decolonizing methods of servingness

Servingness may not be trickling down into student experiences

Specific types of servingness are more popular

Future Work

Further exploring and disaggregating the data to explore servingness for specific groups and intersectional identities

Looking at alignment between admin implementation of servingness and student experiences

Translating Servingness to explore other types of MSIs

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Implications -

- Servingness is present specific types of servingness are showing up more often
- Servingness may be present in all categories, but may not be making it down into student experiences from higher executive decisions
- The population based upon the designation may be served, but cultural specific and decolonizing methods may not be taking the intended populations into consideration

Future Work

- Further exploring and disaggregating the data to explore servingness for specific groups and intersectional identities
- Looking at alignment between admin implementation of servingness and student experiences
- Translating Servingness to explore other types of MSIs to understand and define servingness across MSIs and how to serve different populations

Thank you for listening! Questions?



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