UF|College of Education

Qualitative Analysis of Underserved Students' Experiences in IT Programs of Study

Dr. Justin Ortagus, Dr. Lindsay Lynch, Jay Menees, Hannah Tabor, Nabiha Azaz
FCAN Orlando, FL
May 10, 2022

NSF GRANT NO. 2000621

Critical Need for IT Professionals in Florida

- ▶ Florida Department of Economic Opportunity placed four IT sector jobs on the 2019-2020 Florida Demand Occupation List
  - ▪ Represents 7,549 annual openings
- ▶ Florida Bureau of Workforce Statistics and Economic Research estimated 15,045 annual openings in computer science positions that required a post secondary credential

| Florida High-Demand IT Jobs		
Occupational Title	**Annual Openings**	**Mean Hourly Wage**
Computer Network Architects	1,435	$39.70
Computer Network Support Specialists	990	$27.90
Computer Systems Analysts	1,574	$39.32
Computer User Support Specialists	3,550	$22.86

IT Program at Indian River State College

▶ In response to this workforce gap, IRSC created an umbrella of IT programs

- Enrolls a total of 758 students

- Female and underrepresented minority students are both underrepresented in the program and more likely to withdraw or fail key gateway courses
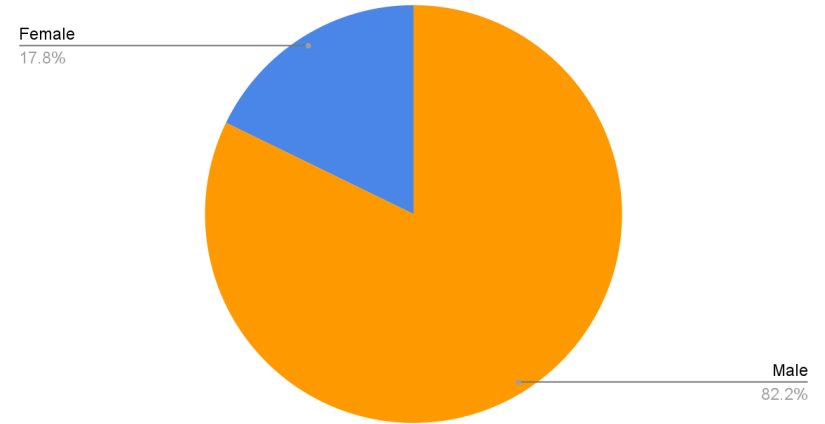
IRSC IT Programs	
College Credit Certificates	**Associate's Degrees**
Computer Information Data Specialist	Computer and Information Sciences
Computer Programming Specialist	Computer Engineering
Help Desk Technician	Computer Information Technology - Programming
Information Technology Support Specialist	Computer Information Technology - Networking
Office Specialist Technical Certificate	**Baccalaureate**
Web Production Technical Certificate	Information Technology Management & Cyber Security

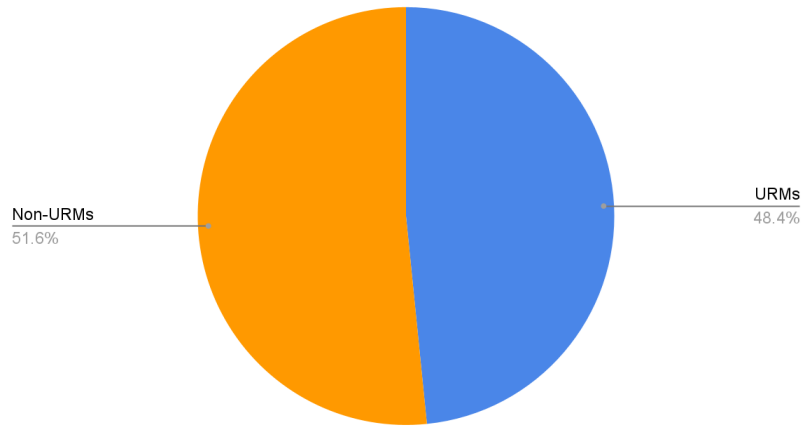# Representation in IRSC's IT Program

IRSC Student Body by Sex

Male
39.2%

Female
60.8%

IRSC IT Program by Sex

Female
17.8%

Male
82.2%

UF|College of Education
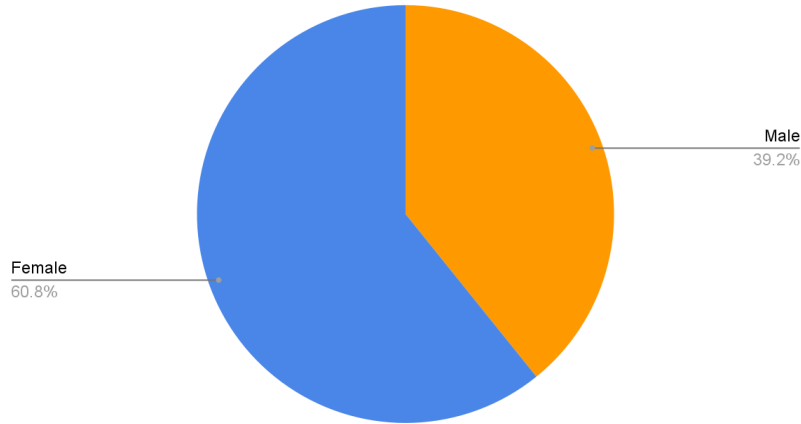
Representation in IRSC's IT Program

IRSC Student Body by URM Status

Non-URMs
51.6%

URMs
48.4%

IRSC IT Program by URM Status

URMs
23.7%

Non-URMs
76.3%

UF|College of Education
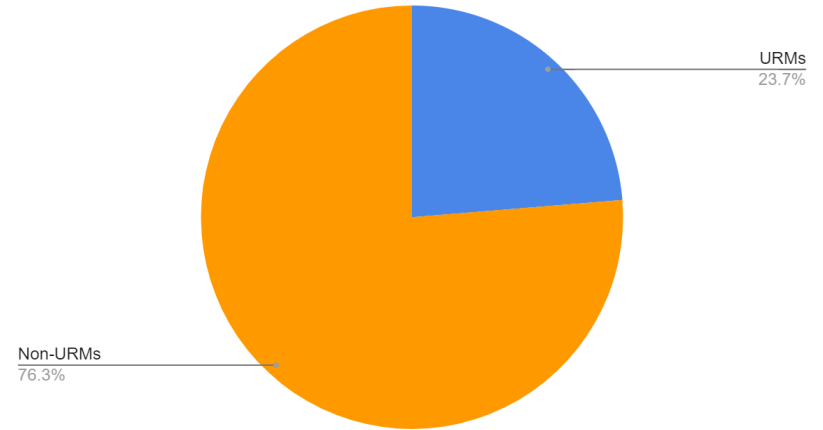
What is iConnect?

- ▸ Partnership between University of Florida Institute of Higher Education and Indian River State College
- ▸ Theory-informed and evidence-generating
- ▸ Encompasses a number of different initiatives and research measures which combine to work toward the purpose of the three-year project

Purpose of iConnect

- To improve access, equity, and success of women and underrepresented racial and ethnic minority students in community college Information Technology (IT) programs of study
- To generate an effective model for improving success of women and underrepresented racial and ethnic minority students that is positioned for replication at peer community colleges nationwide

Goals of iConnect
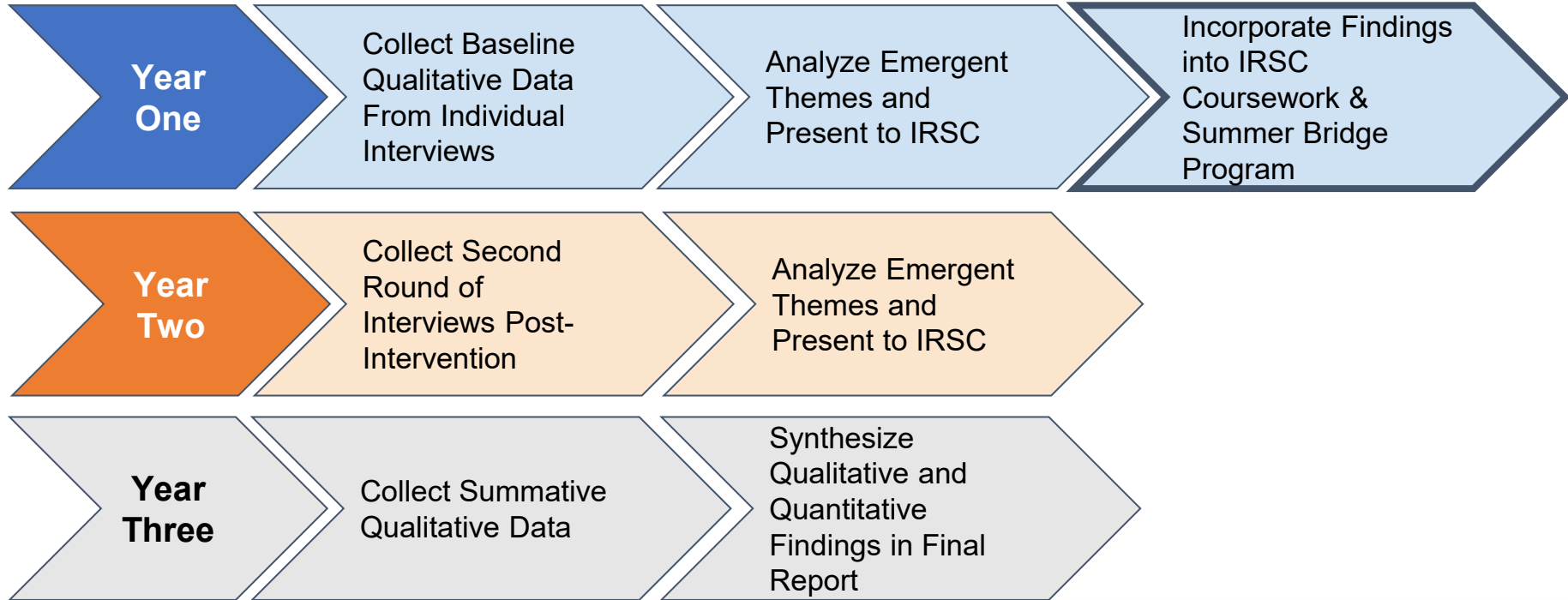
▸ Increase enrollment of underrepresented students in IT programs of study

▸ Increase the percentage of underrepresented students achieving success in key "gateway"courses

▸ Increase in the percentage of underrepresented students persisting from one year to the next

▸ Increase in the number of underrepresented students matriculating into an IT baccalaureate degree

What is iConnect doing?

The team is identified five action areas:

1. Five reconceptualized and redesigned "gateway" IT courses (e.g.,Introduction to Information Sciences, Introduction to Computer Programming, Introduction to Python,and two introductory coding courses)
2. A summer bridge program
3. Embedded internships
4. Industry mentoring programs
5. A team that will implement rigorous mixed-methods research protocol to investigate perceived obstacles, self-limiting behaviors, and the effectiveness of project interventions

Multi-Year Qualitative Process

| Year One | Collect Baseline Qualitative Data From Individual Interviews | Analyze Emergent Themes and Present to IRSC | Incorporate Findings into IRSC Coursework & Summer Bridge Program |

| Year Two | Collect Second Round of Interviews Post-Intervention | Analyze Emergent Themes and Present to IRSC |

| Year Three | Collect Summative Qualitative Data | Synthesize Qualitative and Quantitative Findings in Final Report |

Research Questions

Research Question #1: How do minoritized students experience IT gateway courses and how do those experiences shape their IT-related academic self-efficacy?

Research Question #2: How do minoritized students experience connectedness and self-reflection in their IT program of study?

Research Question #3: What are minoritized students' perceptions of IT career pathways, including pursuit of leadership positions?

What We Expect From The Literature

- Interview questions were drafted based on scholarly research related to URMs in STEM that note the importance of:
  - Math underpreparedness (Carver et al., 2017)
  - Support (academic & career advisors, professor engagement, mentorship) (Lunn et al, 2022)
  - Coursework (uninteresting, too challenging, irrelevant) (Wheeler & Bach, 2020; Burke et al, 2020)
  - Career prospect concerns (continuous credentials, perceptions that employers "don't care") (National Academy of Sciences, 2011)
  - Fear of ostracism (Farmer et al,2006; Ali & McWhirtier, 2006)
- Many of the themes together could be an operational definition for a sense of belonging and self-efficacy in the program and in the field of IT

Interview Participants

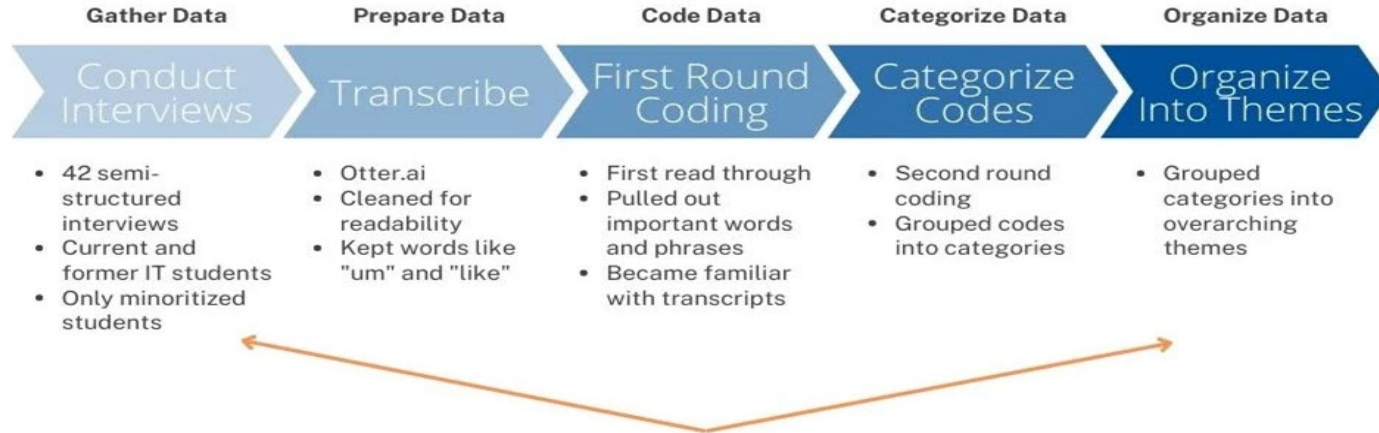- All participants self-identified as female or a member of a racially or ethnically minoritized population

- Participants were current and former IT students at Indian River State College

- White and Asian males were specifically excluded from the participant pool

- Reached saturation around 25th interview

Pool of potential participants (484)

Expressed Interest (72)

Final (42)
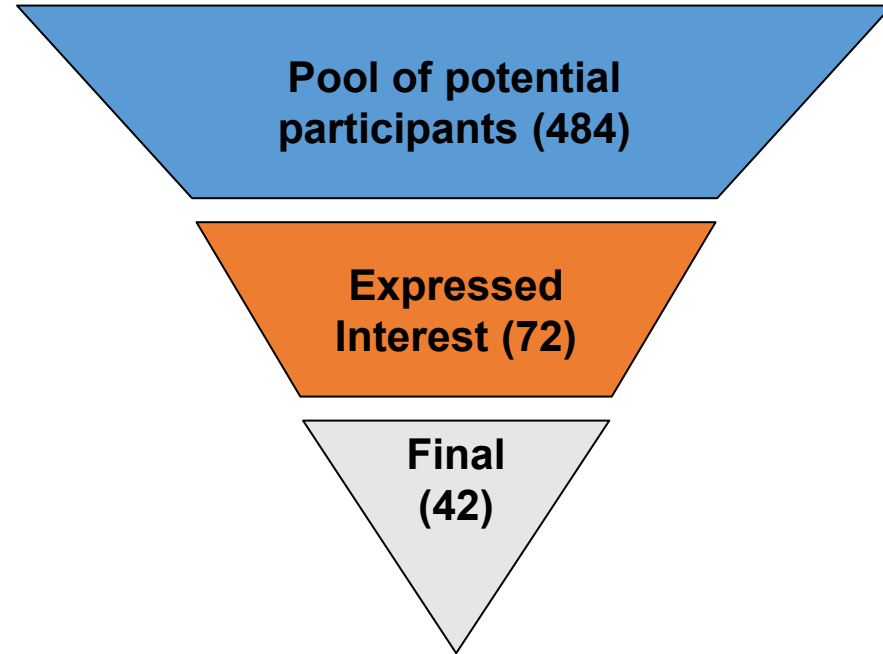
Qualitative Interview Questions

▸ The interview questions were semi-structured

▸ Due to COVID-19 social distancing measures, all interviews were conducted remotely through either video conferencing or telephone

▸ All interviews were recorded and transcribed

▸ Questions were designed based on central themes in the literature: **Self-Efficacy/Preparedness, Support, Encouragement, Career Prospects, Fear of Ostracism**

Data Analysis

Gather Data	Prepare Data	Code Data	Categorize Data	Organize Data
Conduct Interviews	Transcribe	First Round Coding	Categorize Codes	Organize Into Themes

- 42 semi-structured interviews
- Current and former IT students
- Only minoritized students

- Otter.ai
- Cleaned for readability
- Kept words like "um" and "like"

- First read through
- Pulled out important words and phrases
- Became familiar with transcripts

- Second round coding
- Grouped codes into categories

- Grouped categories into overarching themes

Narrative Analysis

Construct a story using narrative elements to describe and represent participant's experiences based upon thematic findings.

Findings and Themes

1. IT Program and Course Design
2. Support and Interactions
3. Career Pathways
4. Student Self-Perceptions

IT Program and Course Design

Program Design

"It was towards my bachelor's degree, I really, really, really, really hated this. You know, online courses… I'd rather talk to a person, go to the class settings, find out [the answer if] you have a question, [or] raise my hand instead of having to wait, you know, for an email response and just getting something bland of an answer."

"It seems they are just reading from a book instead of, you know, from actual experiences that they have encountered in the field. I feel like if they would be more descriptive on how to use it, what we're learning, how they use it, then it would be more beneficial for the future students."

IT Program and Course Design

Course Design

"I do think there should be more hands-on teaching versus just reading from the book…to have more hands-on experience like, 'hey, this is actually what you'll be doing.'"

"It'd be nice to have, you know, real world examples of, like, basically tying assignments to real world activities and what they're used for."

Support and Interaction

Instructor Interactions

"I couldn't tell you any [of] the names of my professors that I've had online. There's not really any actual interaction like there is in-person."

"The most interactive professor I ever had … showed us everything that was possible for us to do. He showed us the VR, he showed everything like that and it made me feel like we could actually do it."

Support and Interaction

Classmate Interactions

"People in my program are very loving and helpful. I never thought people could actually be really nice… we were all helpful towards one another. One group got their assignments done, and me and my friends were unable to get ours done. They came over to chat and started helping us."

"I know a few people in my IT circle, basically friends, who are going through the same courses as well. So we just sort of go back and forth. And if we do need help at a certain aspect, then we are readily available."

Support and Interaction

Influence of Family and Friends

"It's really my grandparents. Like there was a time where I lost my financial aid, because I failed math, so I was no longer eligible. They were the ones that were willing to fork over the money to help pay for the classes. So knowing that they were actually willing to do that…[it] reassured me."

Career Pathways

Certifications

"I've heard from jobs that you need certifications…I've taken my first part of networking two years ago, but I still haven't taken my second part of networking. And so if I wanted to go and get my network certification, [there would] be, like, a gap in one part of my education."

"I feel like they should be pushing more towards getting cert[ification]s at the beginning [and explain that] 'you know, they have different certifications for this or that industry.'"

Career Pathways

<u>Career Knowledge and Opportunities</u>

"On the school's website, it shows you the types of jobs you can obtain and their roles and where you can get those jobs. So it tells me...all different places I can use my degree."

"And the marketplace right now [is] so saturated that it is hard for somebody who's going to graduate with an associate's or bachelor's in cybersecurity, to go out and get, you know, a well-paying job."

Student Self-Perceptions

Confidence Level

"I felt that I could do anything, and now that I'm into it, I don't feel like it's possible."

"I'm always thinking, like, am I actually gonna finish this? Am I actually going to be able to do this? Yeah, I just stopped thinking about it. I just do it…I'm like, stop thinking, just do it."

Student Self-Perceptions

Self-Doubt

"The [social media] pages that I follow with women in tech, a majority of them have to do with Black women being in tech because not only is tech male dominated, there are not a lot of Black people – much less Black women in tech. So I follow these because I used to have a lot of self-doubt in the past. Like, am I even gonna be smart enough for this, good enough for this? Am I gonna get past the interview?"
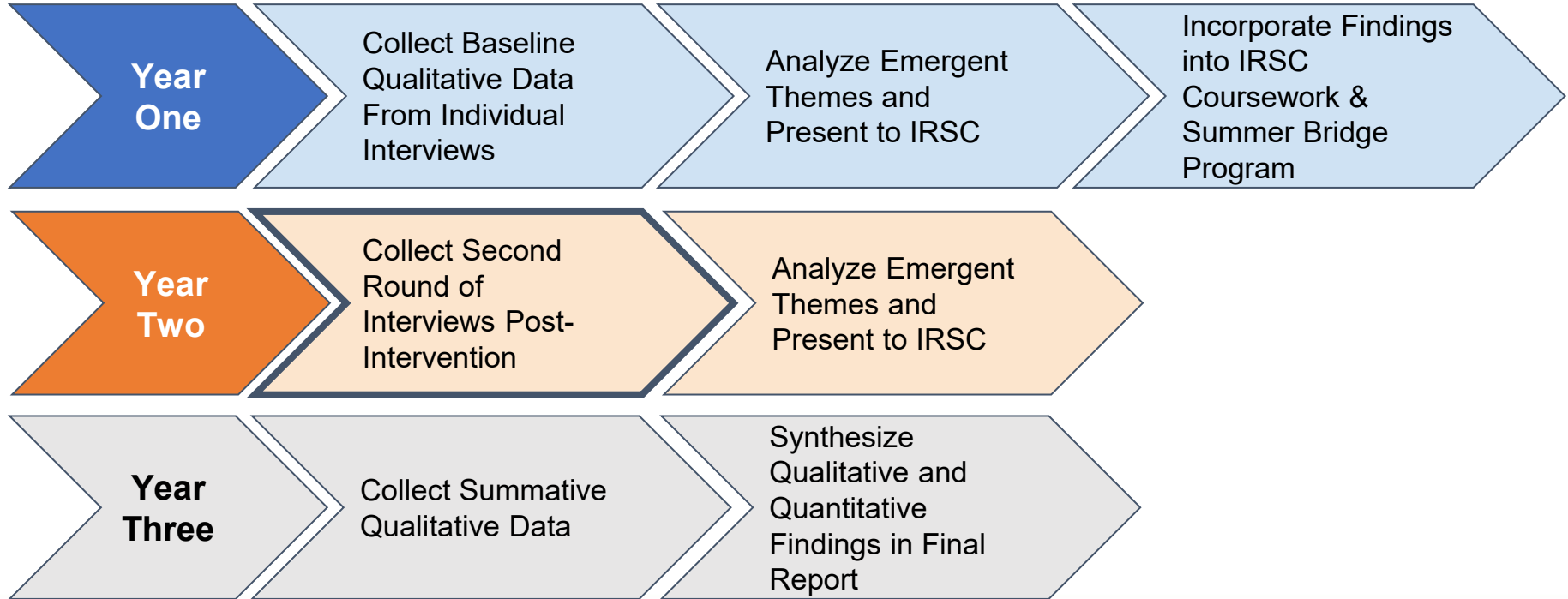
Student Self-Perceptions

Representation

"A lot of my coworkers are, are White. I haven't seen a Black IT person. Or, I wouldn't say that, it's not very frequent...that's something that I do notice."

"Me, just being a female in general, I feel like it's intimidating for me to just walk into an office, like my future job, and, you know, just be me, and, you know, there probably would be a lot of men in there because it is a male-dominated field. I don't know...I just, I feel like it would be a little bit...intimidating."

Recommendations

1. Include problems and lessons based on real-world, workplace-based examples in class assignments
2. Embed IT certifications within the degree sequence
3. Provide opportunities for online students to engage (synchronously) with classmates and professors
4. Create hands-on learning opportunities and internships
5. Promote diversity efforts focused on gender and race/ethnicity through marketing materials and student organizations

Next Steps

Year One
- Collect Baseline Qualitative Data From Individual Interviews
- Analyze Emergent Themes and Present to IRSC
- Incorporate Findings into IRSC Coursework & Summer Bridge Program

Year Two
- Collect Second Round of Interviews Post-Intervention
- Analyze Emergent Themes and Present to IRSC

Year Three
- Collect Summative Qualitative Data
- Synthesize Qualitative and Quantitative Findings in Final Report

Contacts

Justin Ortagus, Ph.D., jortagus@coe.ufl.edu (PI)

Associate Professor, Higher Education Administration & Policy

Lindsay Lynch, Ed.D., lblynch@coe.ufl.edu (Co-PI)

Clinical Assistant Professor, Higher Education Administration & Policy

Jay Menees, jaymenees@ufl.edu

Graduate Research Assistant, Doctoral Program in Higher Education Administration & Policy

Hannah Tabor, htabor12@ufl.edu

Graduate Fellow, Doctoral Program in Higher Education Administration & Policy

Nabiha Azaz, nazaz@ufl.edu

Undergraduate student in Anthropology with a minor in Education