



# *A Cyber Bridge Experiment*

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# Disclaimers & Limitations



- **Opinions expressed are those of the presenter.**
- **Any products, services or resources are mentioned for illustrative purposes only. This should not be interpreted as official endorsements by the presenter, Norfolk State University or its research partners.**
- **This research was performed in part through a digital enablement grant from PriceWaterhouseCoopers.**
- **Results are preliminary and qualitative due to time and resource constraints.**

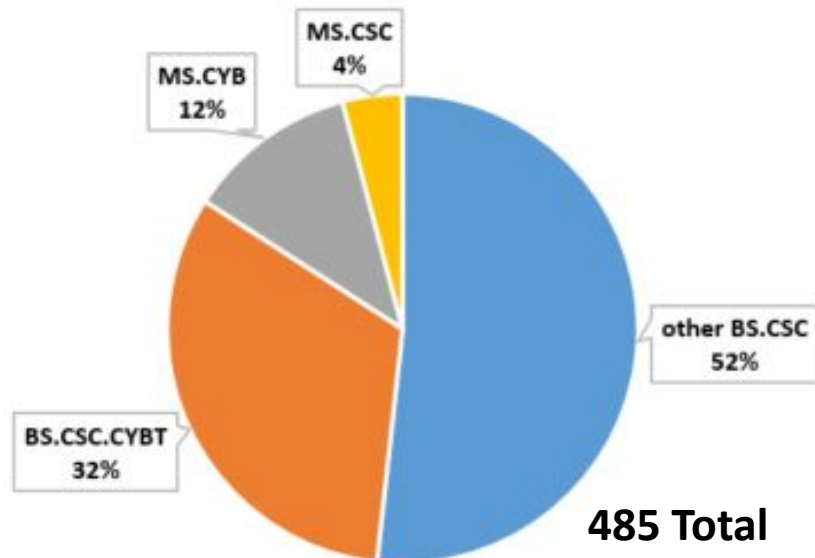
- **Dr. Mary Ann Hoppa**
- **Computer Science Professor at NSU**
- **Cybersecurity Graduate Program Coordinator**
- **40 years IT R&D experience**
- **Research interests:**
  - **Cybersecurity**
  - **Cyberpsychology**
  - **Big Data + ML + AI**
  - **Gamified Learning**
  - **Pedagogy**



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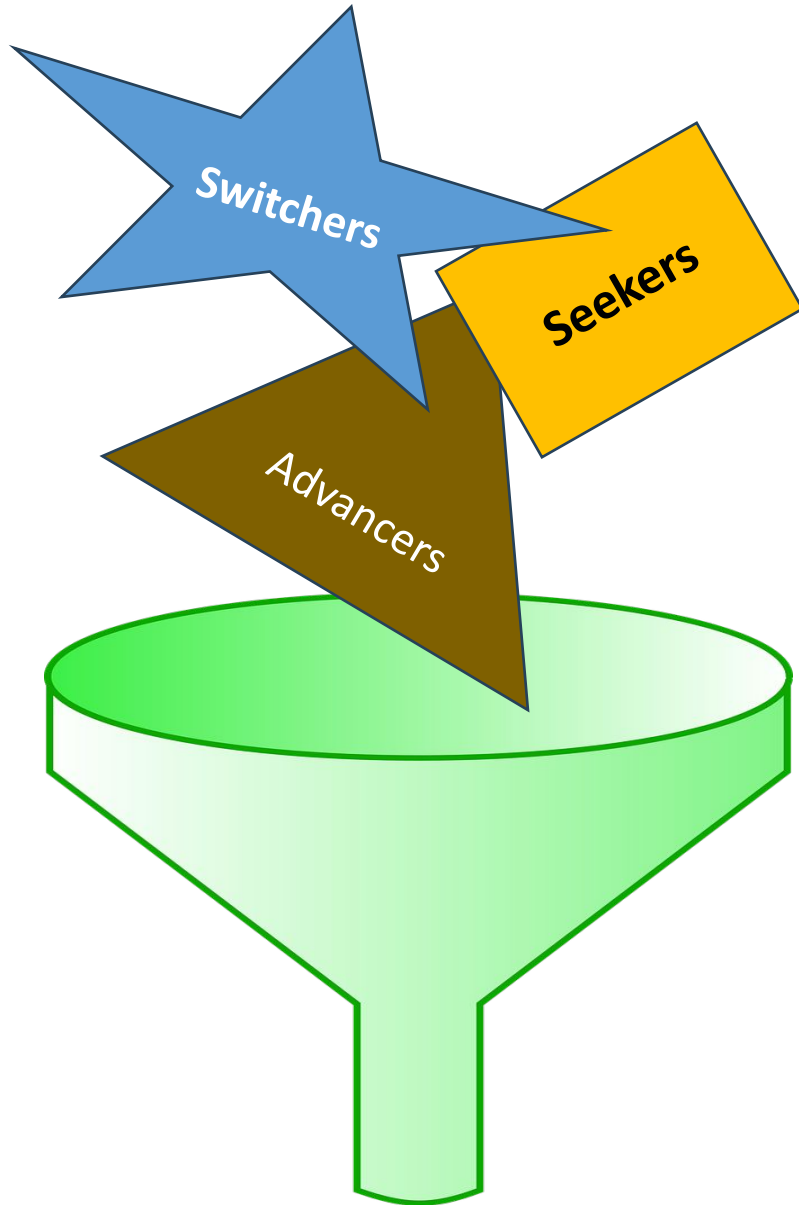
# NSU Cybersecurity Overview

- MS.CYB
  - 36 credit-hours, “all online”
  - 160 conferees to date (~20 per year)
  - 15 +/- 5 new students each semester
- BS.CSC + “cyber track”
  - junior/senior electives to achieve the specialization
- MS.CYB.ACC
  - Well-qualified seniors take up to 12 MS.CYB “jump-start” credits



- Program enhancements underway
  - Add electives to enrich curriculum & support new options (Fall 2025)
  - Add non-capstone (“cert exam”) and thesis options to MS.CYB (Spring 2026)
  - Expand accelerated BS to MS.CYB to additional disciplines
  - Stand up “branded” BS.CYB degree
  - Strengthen CompTIA, IBM, Coursera partnerships for certifications & industrial-strength course offerings / enhancements
  - Institutionalize the “cyber bridge”

# Why a Cyber Bridge...?



- 500K unfilled U.S. cybersecurity jobs
- Certification, security clearance, experience expectations
- NSU's MS.CYB program admits diversely prepared students
- Under-represented, under-served   
under-prepared, under-resourced
- "Train as we will work"

# Questions



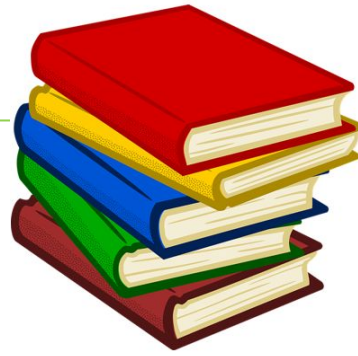
- To what extent does participating in a **FREE, four-week virtual bootcamp-style learning experience** impact:
  - **student outcomes**
  - in-program **retention**
  
- To what extent can we positively impact students':
  - **familiarity** with relevant technical topics
  - **awareness** of helpful resources
  - **confidence** in their potential for academic success

*How do we “level up” under-prepared students for cybersecurity studies???*



- Design the curriculum
- Implement in Blackboard
- Recruit participants
  - **Experimental:** Fall 2023 cohort
  - **Control:** 2<sup>nd</sup>+ semester students and recent graduates
- Encourage / monitor engagement
- Collect qualitative feedback
- Measure performance & retention
- Make observations
- Consider next steps

# ***Cyber Bridge Curriculum***



## **• Onboarding**

- Overview
- Baseline Survey Reminder
- MS.CYB Student Handbook
- Additional Policies & Procedures
- Blackboard: NSU's eLearning Platform
- Other Tools
  - MS WORD, Excel, Powerpoint
  - Google Docs, Sheets, Slides
  - Client Services

## **• Jumpstart**

- Overview
- Intro to Operating Systems
- Intro to Computer Science
- Intro to Computer Programming Concepts
- Program Language Basics: Python
- Relational Databases & SQL Basics
- Intro to Tech Writing
- Intro to Cybersecurity
- Ethics in Cybersecurity

## **• Connections**

- Overview
- PwC Cybersecurity Virtual Consulting Experience
  - Completion Certificate
  - Dropbox
- Connect with other students
- Looking for an Internship or Job?
- Your Cybersecurity Portfolio

## **• Assessments**

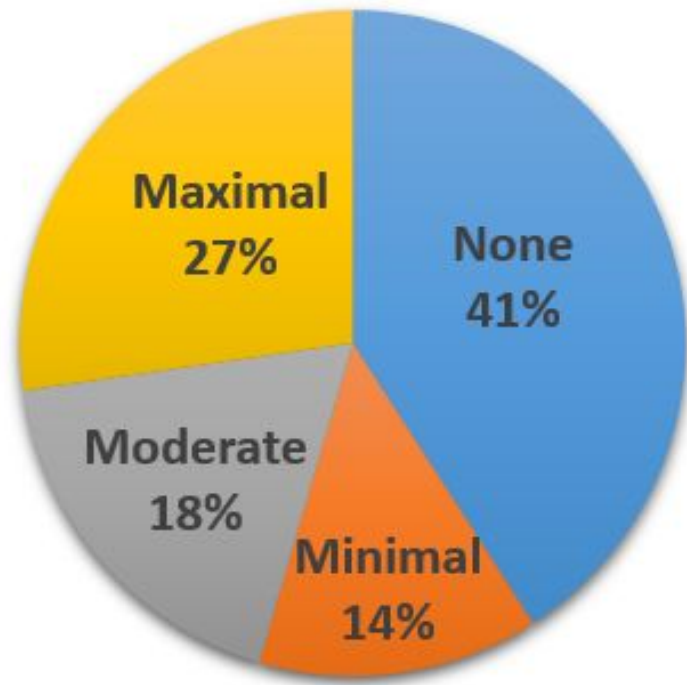
- Certification Preppers
  - Professor Messer
  - (ISC)2 Certified in Cybersecurity
  - Google Cybersecurity Professional Certificate
- Benchmark Surveys Reminder

## **• Questions & Comments**

# Metrics details

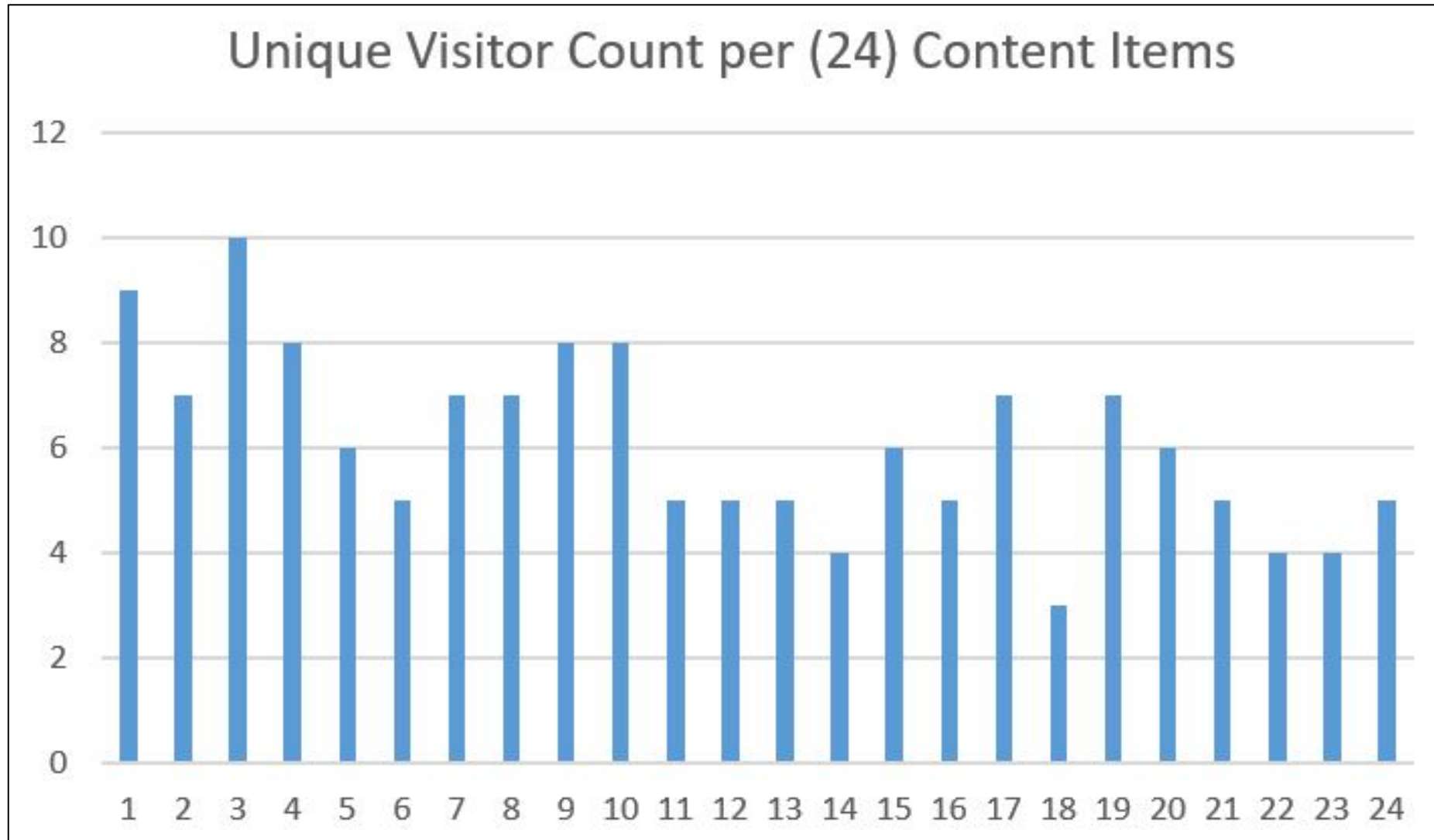


## Cohort Participation (22 students)



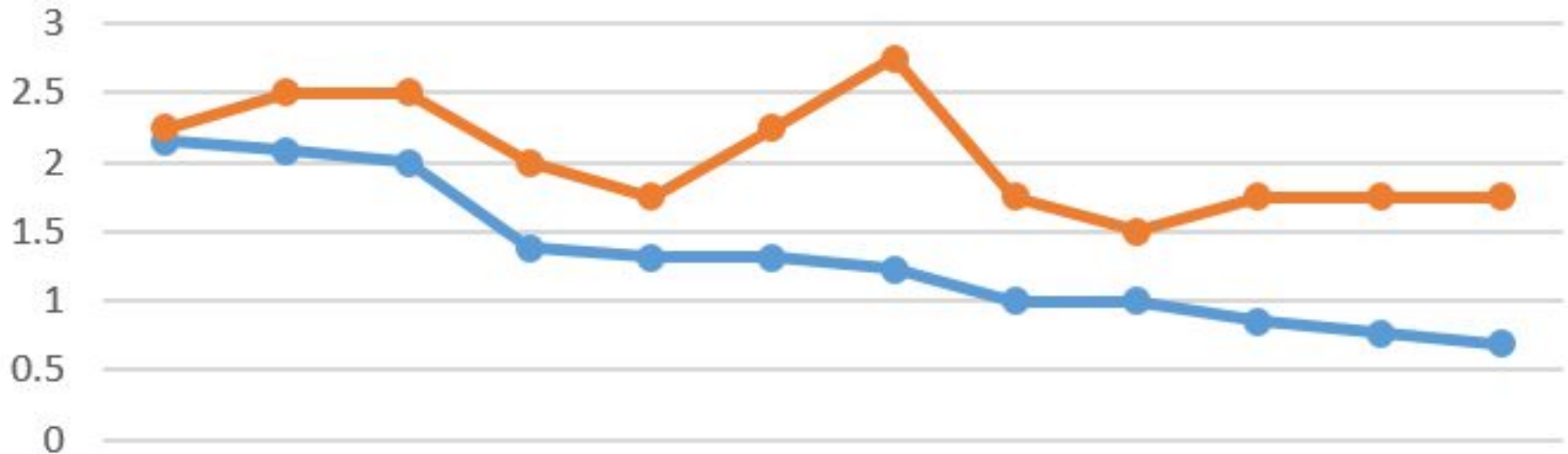
## Likert Scaling: quantify qualitative self-ratings

- 0 = none
- 1 = little
- 2 = some
- 3 = very; strong



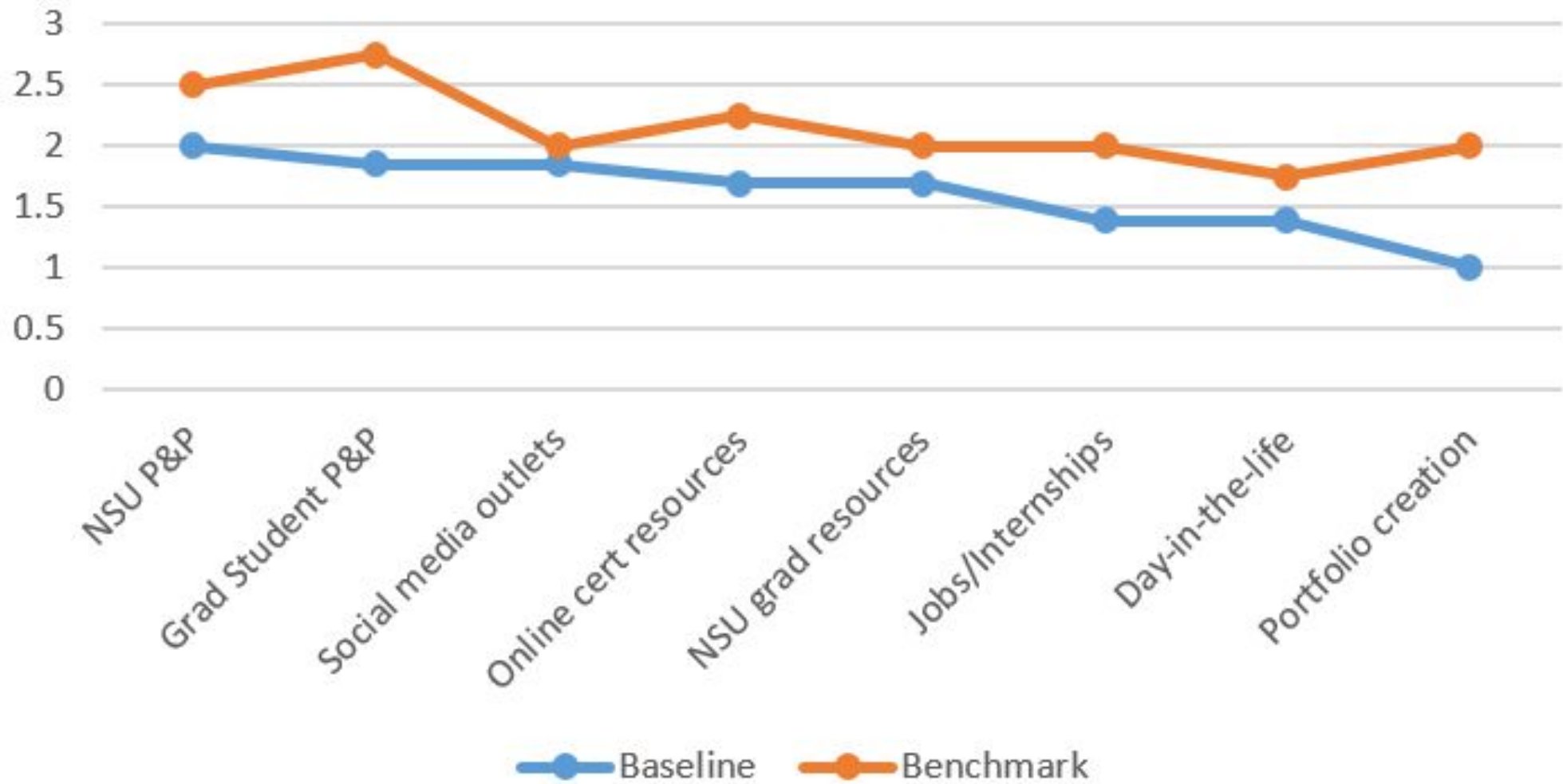
**Most visited item (#3 – Graduate Student Handbook)**  
**Least visited item (#18 – Consulting)**

# Topical Familiarity



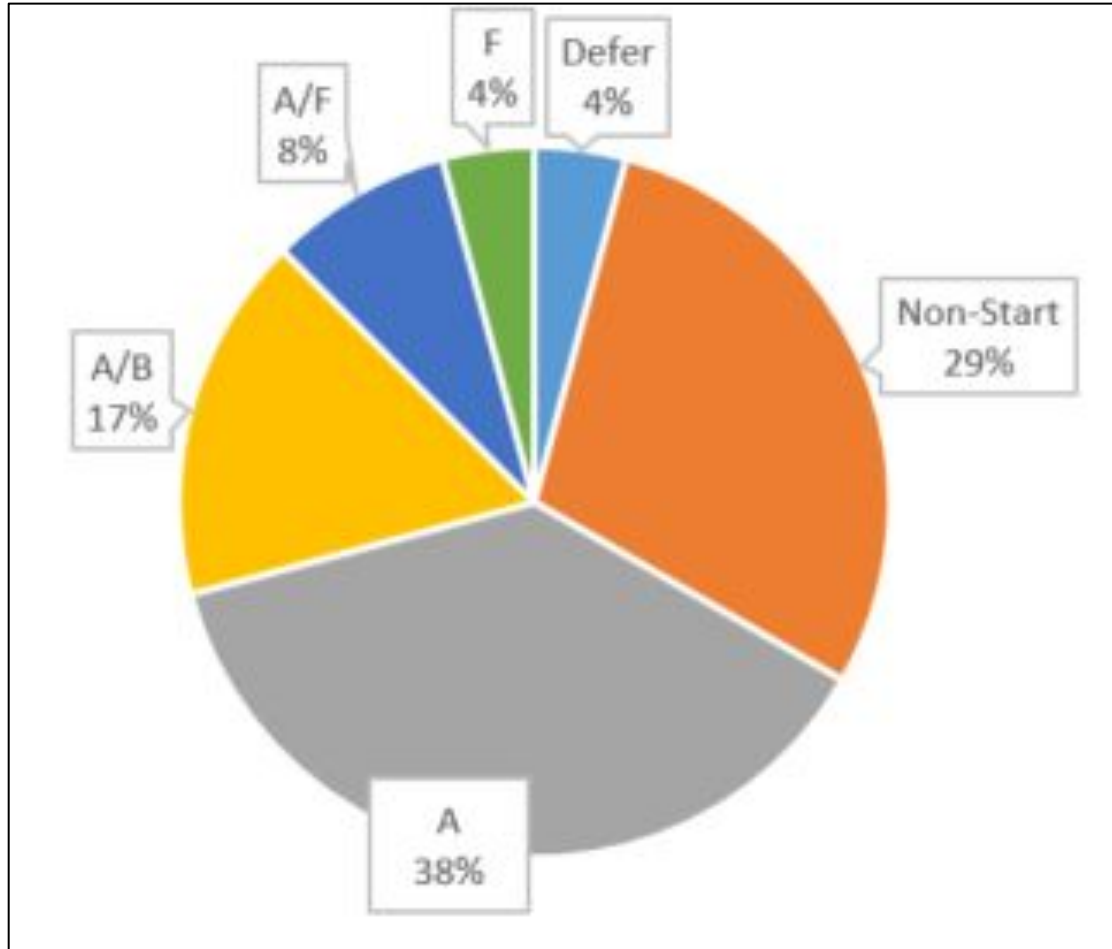
—●— Baseline —●— Benchmark

# Resource Awareness

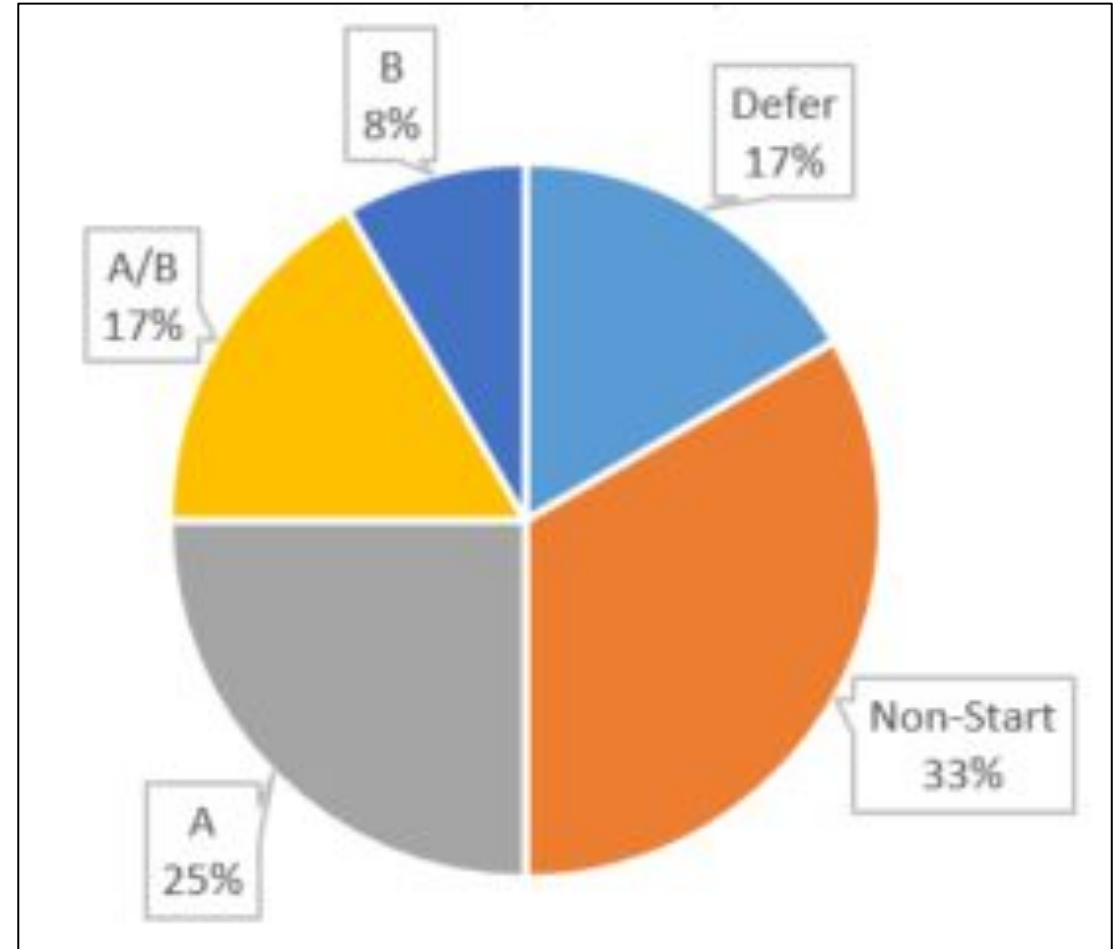


<b>Self-confidence of Success</b>	<b>Very confident (3)</b>	<b>Somewhat confident (2)</b>	<b>Somewhat UNconfident (1)</b>	<b>Very UNconfident (0)</b>	<b>Average</b>
<b>Baseline (before)</b>	38.46%	61.54%	0.00%	0.00%	2.38
<b>Benchmark (after)</b>	0.00%	100.00%	0.00%	0.00 %	2.00

# Student Outcomes

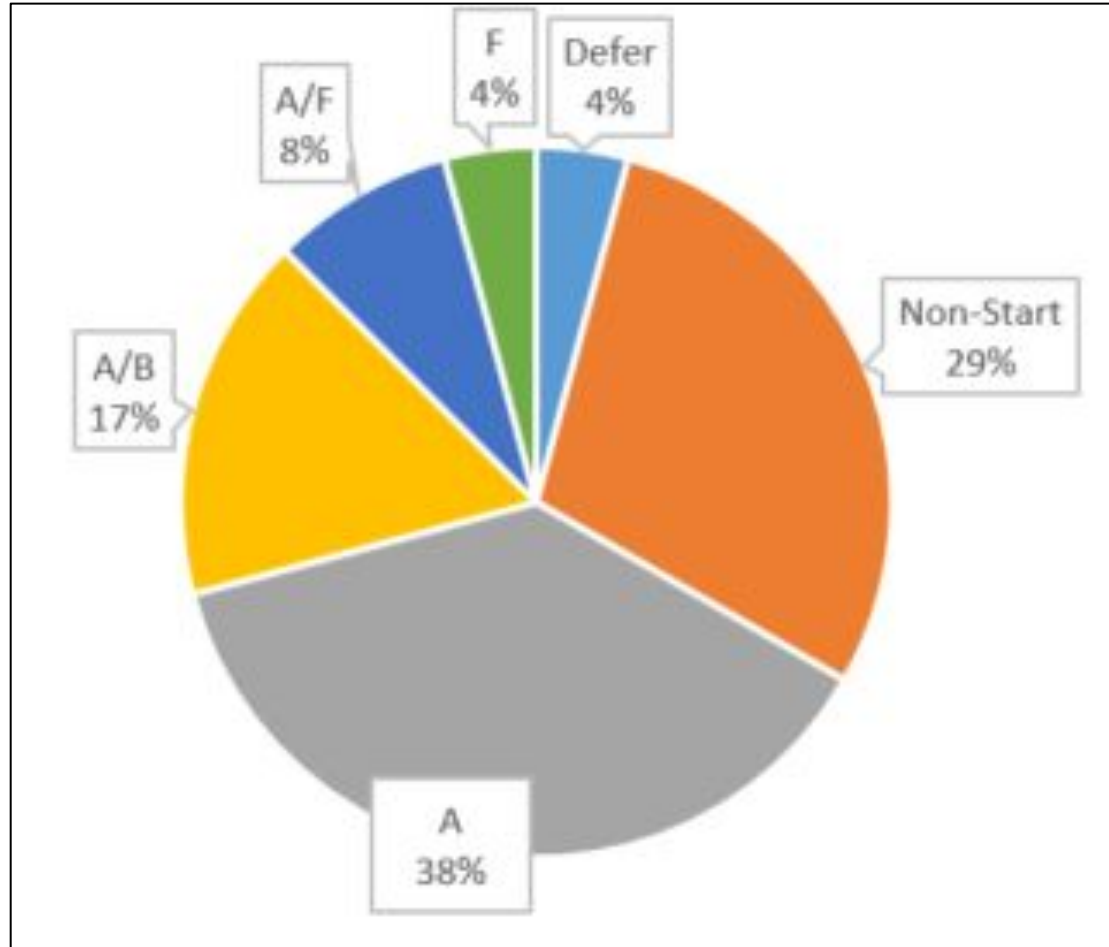


**Fall 2022 & Spring 2023 (pre-bridge)**

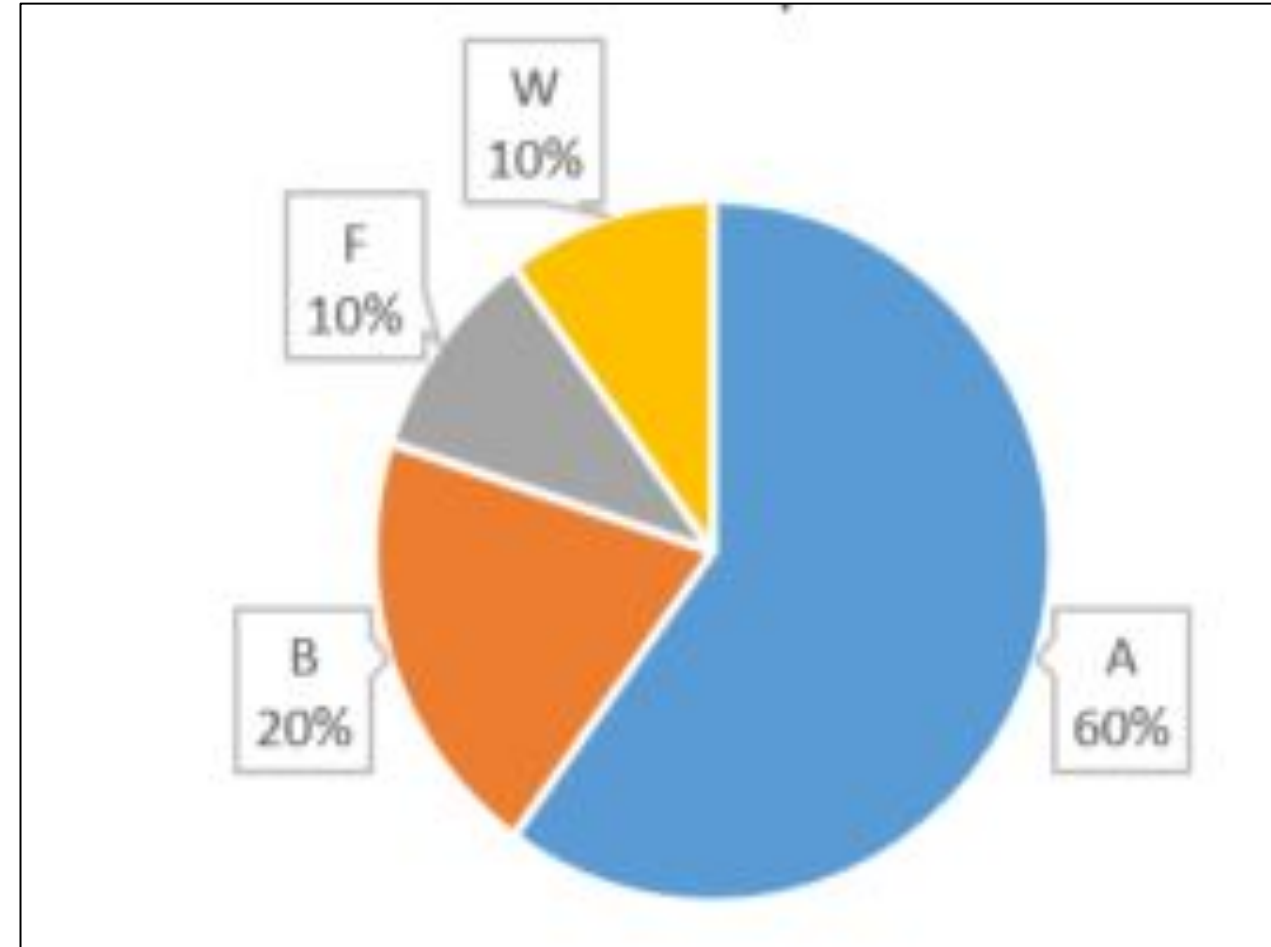


**Non-participants (Fall 2023)**

# Student Outcomes

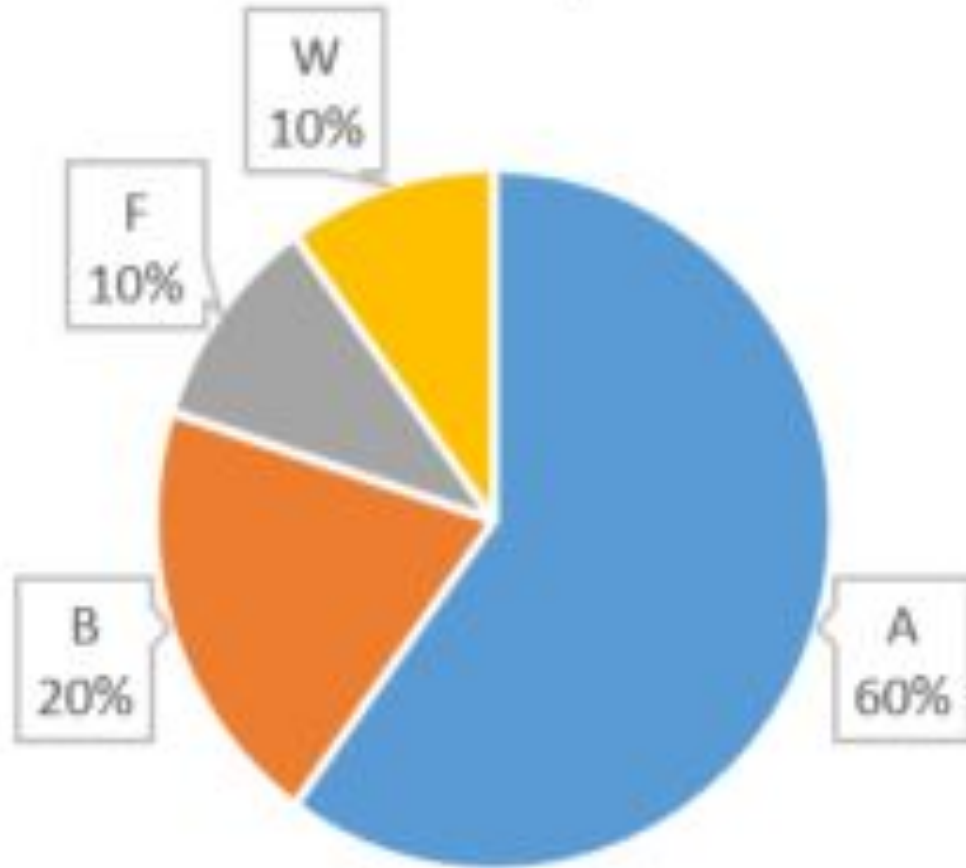


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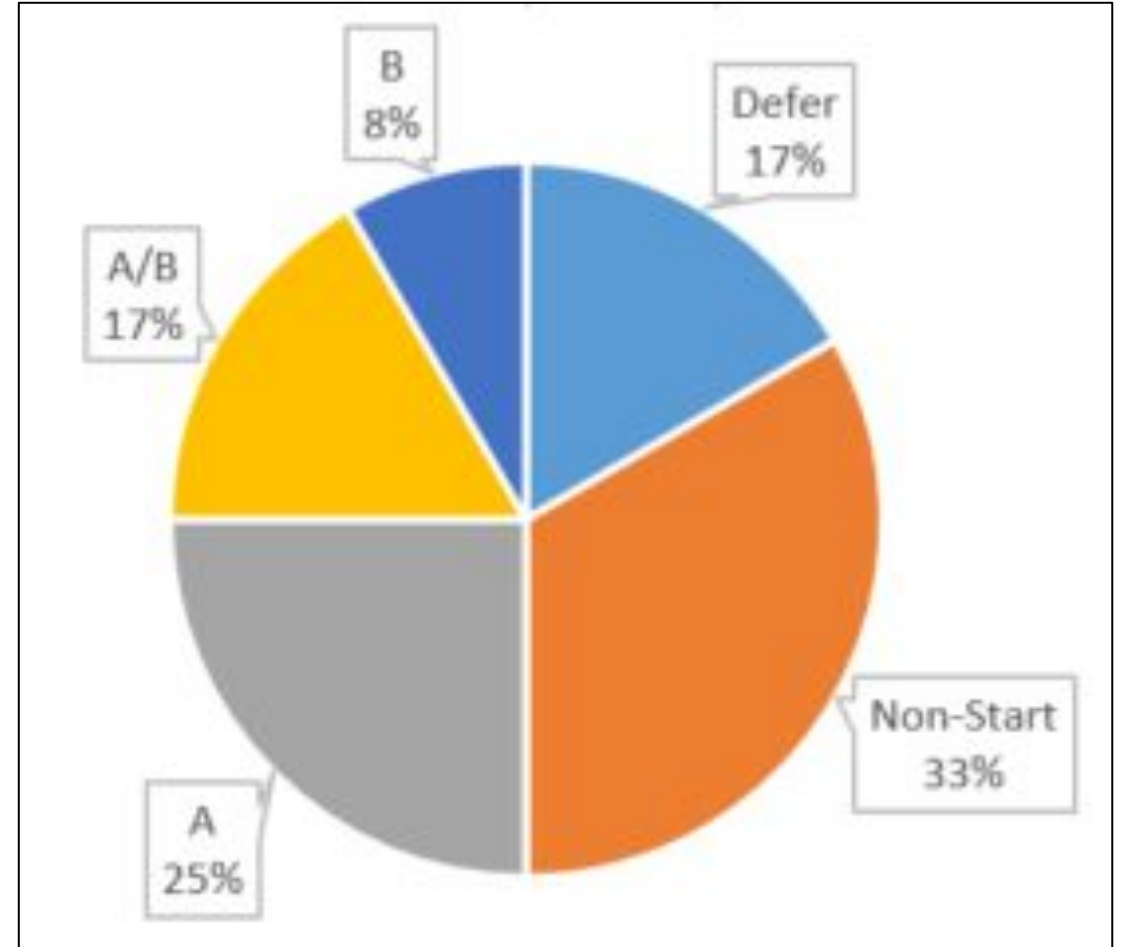


Participants (Fall 2023)

# Student Outcomes (Fall 2023 cohort)



**Participants**



**Non-participants**

# Outcomes & Retention Summary



- In general, NSU MS.CYB students who successfully complete their first semester with passing grades are retained to the second semester, and eventually complete the program.
  - Participants: 80% passed all first semester courses
  - Non-participants: 50% passed all first semester courses
  - Pre-bridge: 55% passed all first semester courses
- Other factors that impact retention:
  - Low GPA; Academic probation
  - “Life events”

**Weakly supports concluding that *Cyber Bridge* participation positively impacts outcomes & retention ... but more data are needed**

# STUDENT CONCERNS

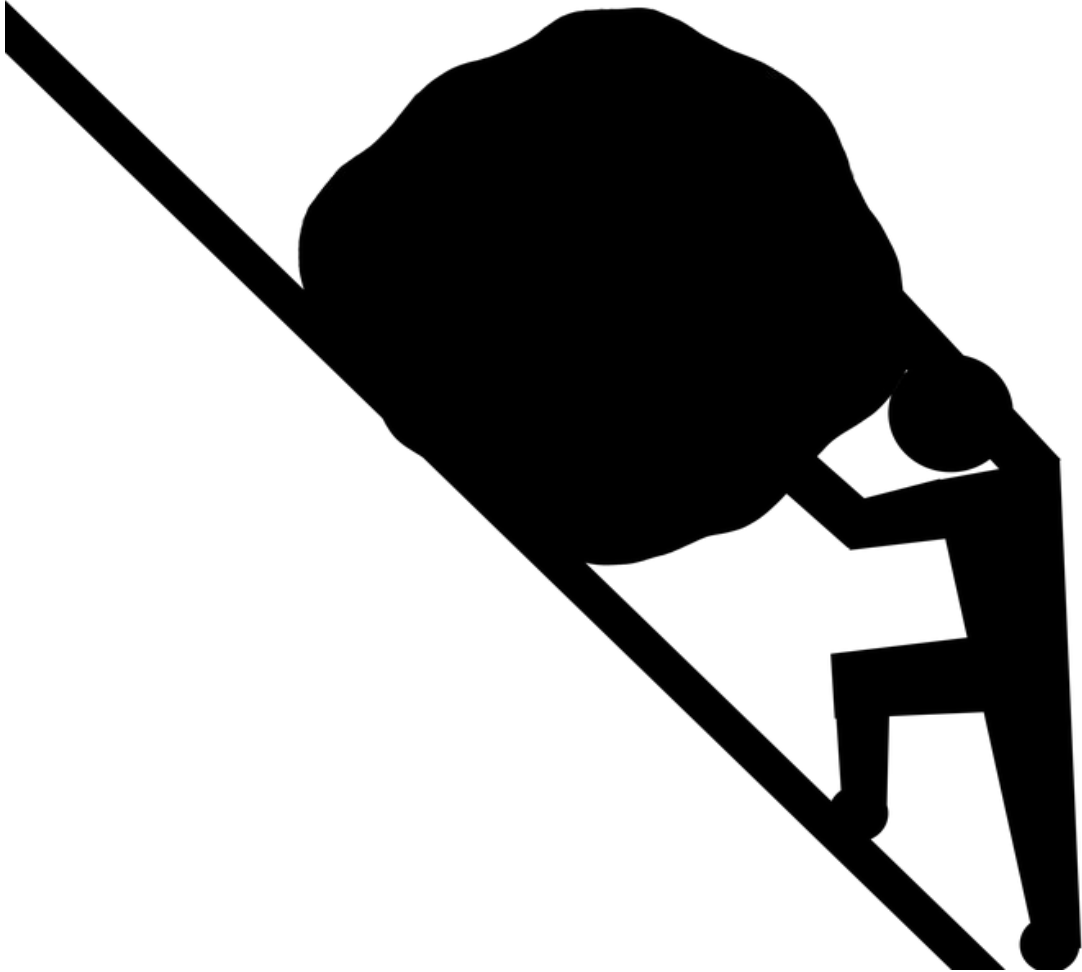
- Financial assistance
- Difficulty of the material
- Employment opportunities
- Resource availability



# SUGGESTIONS

- Certification prep courses
- Cloud-related courses
- Clubs and groups to help professionally

# Challenges



- **Student participation / motivation**
- **Keeping content fresh & relevant**
- **In-person / synchronous contact**
- **Sustained funding**

# Conclusions

*... but more data are needed*



- ***Cyber Bridge* participation may positively impact:**
  - topical familiarity
  - resource awareness
  - student outcomes
  - retention
- ***Cyber Bridge* participation may “moderate” student confidence**
- **Effective motivators remain elusive**

# Opportunities / Future Directions

- **Integrated self-assessments**
- **AI virtual teaching assistant**
- **Grants and/or angel investors**
- **Mobilized freemium model**
- **Complementary brain-training**





# ***A Cyber Bridge Experiment***



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