Women's Perceptions Of Problem-Solving In a Virtual Learning Environment

Gender Differences in the Computing Workforce: Engagement in Network Systems Administration

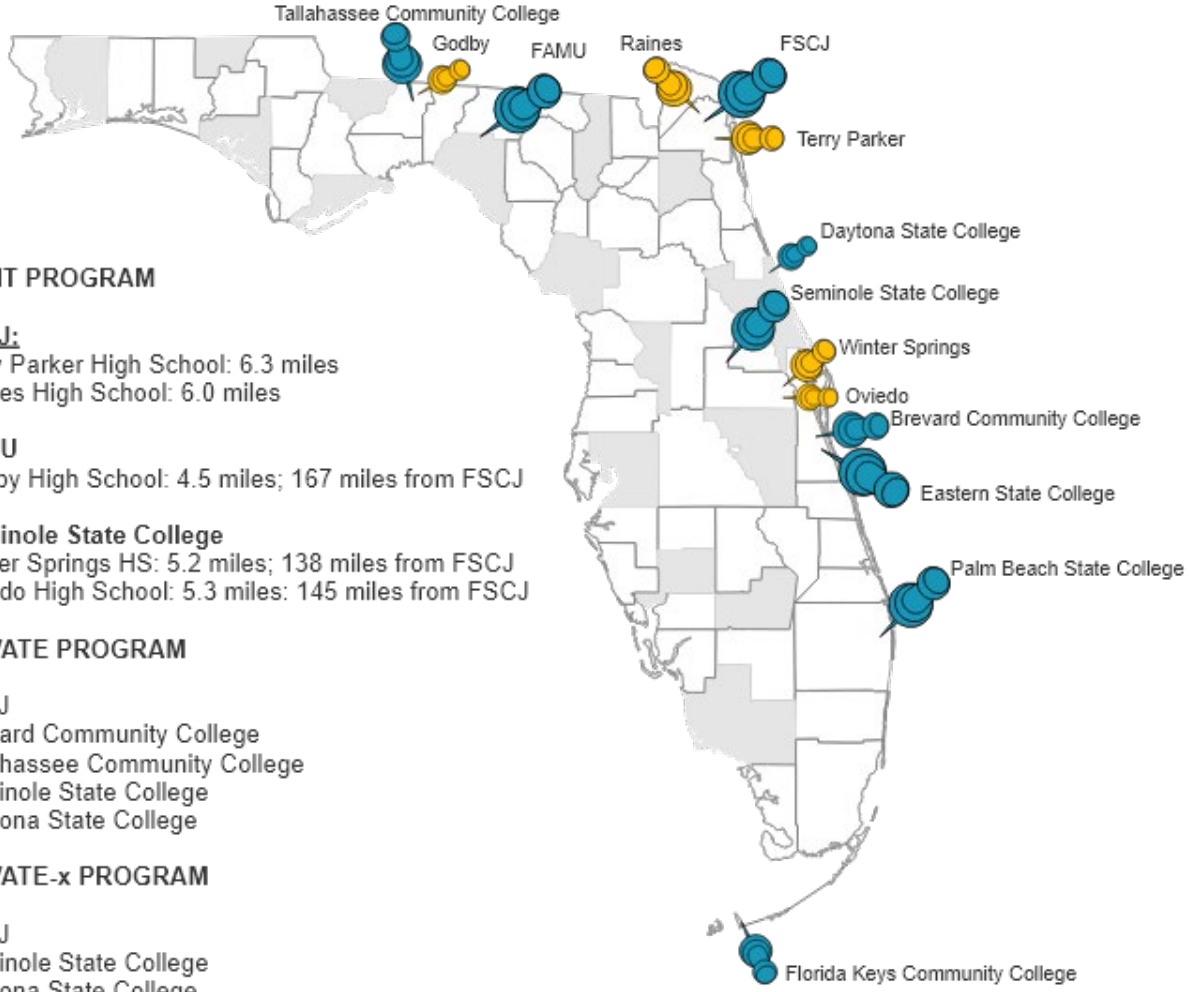
Dr. Kimberly T. Luthi, Dr. Angelique Tucker-Blackmon, and Mr. Ernie Friend.

OVERVIEW AND AGENDA

- iNoVATE-Expansion Project
- Network Enterprise Administration Certificate Program
- Literature on Perceptions of Problem Solving in a Virtual Learning Environment
- Evaluation Results
- Discussion & Conclusion
- Implications

Ernie Friend, Principal Investigator

- Executive Director, the Florida Advanced Technological Education Center (FLATE), a National Science Foundation Center of Excellence in high-technology manufacturing.



TRI-IT PROGRAM

FSCJ:
Terry Parker High School: 6.3 miles
Raines High School: 6.0 miles

FAMU
Godby High School: 4.5 miles; 167 miles from FSCJ

Seminole State College
Winter Springs HS: 5.2 miles; 138 miles from FSCJ
Oviedo High School: 5.3 miles: 145 miles from FSCJ

iNoVATE PROGRAM

FSCJ
Brevard Community College
Tallahassee Community College
Seminole State College
Daytona State College

iNoVATE-x PROGRAM

FSCJ
Seminole State College
Daytona State College
Eastern State College

Institute for Food Safety

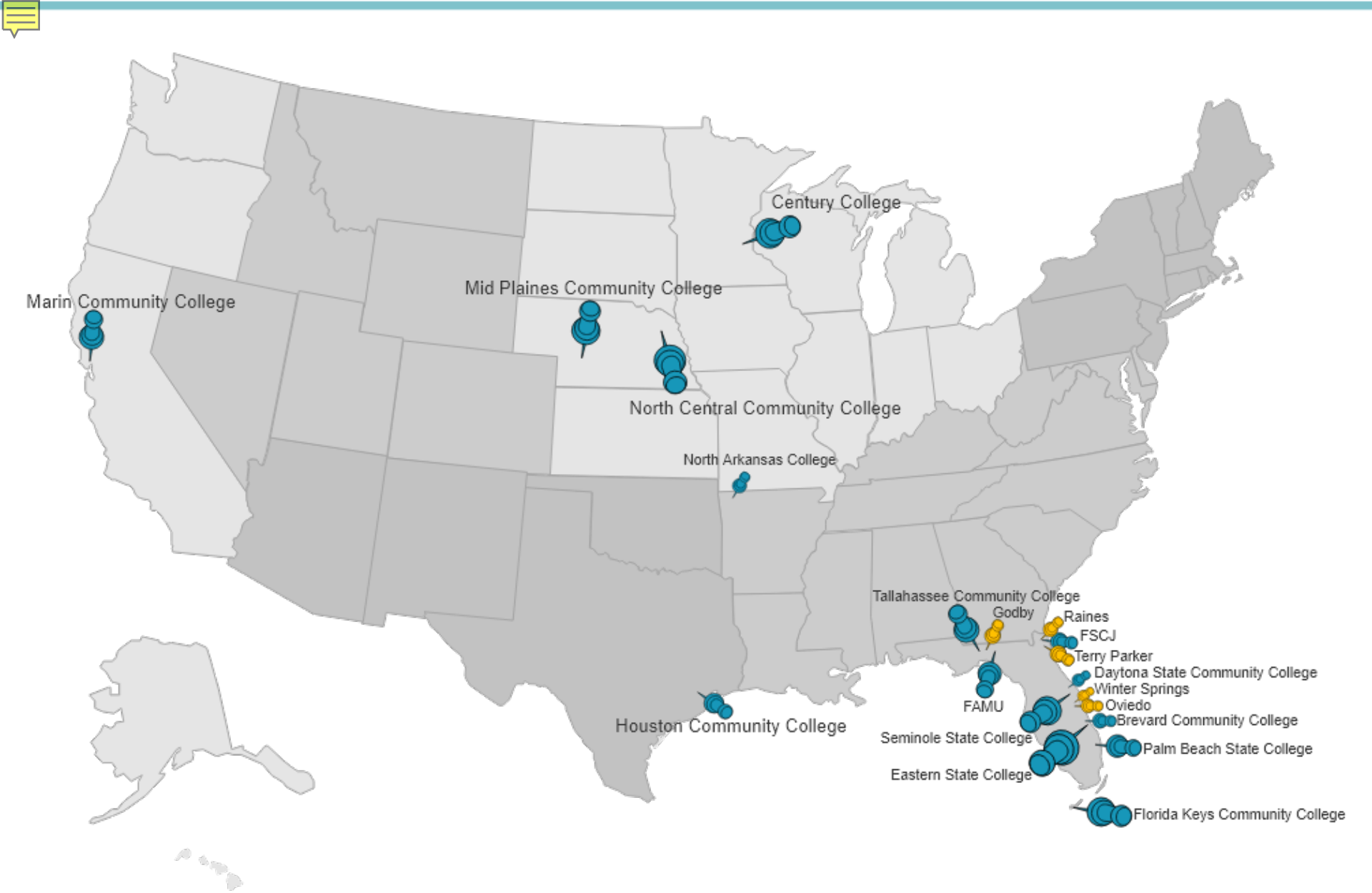
FSCJ
Palm Beach State College
Florida Keys Community College

InovATE Grant History

- iNoVATE: A Network Virtualization Project
  - Resulted in the creation of a Network Virtualization technical certificate
  - Over 100 community college faculty completing professional development in network virtualization
  - Over 100 students enrolled in newly developed network virtualization courses.
  - Major project activities include:
    - Designing, implementing, and disseminating the curriculum for the new Network Virtualization Technical Certificate
    - Expanding Network Virtualization labs
    - Developing and offering workshops and other teaching resources for faculty
    - Disseminating information about the Network Virtualization program to rural and underserved areas.
    - The project team measured and tracked student knowledge and the development of discipline-specific problem-solving skills for statistical comparison and longitudinal analysis, improving project strategies and building a strong foundation for future research

InovATE-X Grant History

- InovATE-X: Network Enterprise Administration Project
  - This project increased the accessibility of technical education for rural and underserved Florida residents, with a focus on the skills needed to operate a modern data center
  - Created curriculum for a new Network Enterprise Administration technical certificate
  - Partners in this project include Florida State College at Jacksonville, Daytona State College, Eastern Florida State College, Seminole State College, Tallahassee Community College, and the National Convergence Technology Center (an Advanced Technological Education [ATE] national center)
  - Fourteen business and industry partners worked with the educational institutions to develop the curriculum, train faculty, and provide opportunities for students


Century College
Marin Community College
Mid Plaines Community College
North Central Community College
North Arkansas College
Tallahassee Community College
Godby
Raines
FSCJ
Terry Parker
Daytona State Community College
Winter Springs
Oviedo
Brevard Community College
FAMU
Seminole State College
Palm Beach State College
Eastern State College
Florida Keys Community College
Houston Community College

Grant Study

- This study was designed to assess the impact of a virtual learning environment on women's perceptions of problem-solving confidence, approach, and control.
- Women college students engaged in lessons on Basic and Advanced Microsoft Server Installation and Configuration and Administration to increase their information technology skills.
- Women college students learning to configure network servers are expected to encounter problems and challenges that they did not anticipate. As such, a critical aspect of the program was to ensure students had the necessary problem-solving confidence and control to troubleshoot servers as difficulties arise in the workforce.
- Specifically, this study measured students' active engagement within the online platform and change in problem-solving confidence after participating in a 16-week online course.

Kimberly T. Luthi, Ph.D.

Research Collaborator

Faculty, College of Aeronautics, Embry-Riddle Aeronautical University-Worldwide

Literature Review

- Asikov (2019)- Technology enhanced e-learning platforms improve problem-solving skills.
- Kim & Jun-Sub (2018)-Self-efficacy, confidence and problem-solving abilities increased.
- Shchedrina et al. (2020)-Students were engaged in a faster acquisition of learning competencies.
- Seda, Akti & Kernal (2021)- Efficient problem-solving skills in virtual environment.

Sampling Frame

- Undergraduate students at five two-year colleges

Students responded to the following surveys:

- Problem-Solving Inventory
- The Server Configuration and Administration Course questionnaire, and
- The MCSA411 questionnaire.

Angelicque Tucker Blackmon, Ph.D.

Principal Evaluator

Innovative Learning Center, LLC

Atlanta, Georgia

22 years conducting research and evaluation studies

Research Design

The study was designed to answer the following research question:

- Is there a statistically significance difference in perceptions of problem-solving between men and women in courses that use virtual online learning platforms?

Problem-Solving Inventory

- The Problem Solving Inventory (PSI) is designed to measure adults' perceptions of problem-solving ability (Heppner, 2009).

- Measures a person's appraisal of their problem-solving abilities rather than the person's actual problem-solving skills.

Problem-Solving Inventory

In the evaluation study, the PSI measured the following variables:

- Confidence (6 items)
- Personal control (4 items)
- Approach (2 items)
- Avoidance (2 items)

Problem-Solving Inventory

- *"I am usually able to think up creative and effective alternative to solve a problem."* (confidence)
- *"When a solution to a problem was unsuccessful, I do not examine why it didn't work."* (approach-avoidance)
- *"I make snap judgments and later regret them."* (personal control)

Data Analysis

- Descriptive statistics by time point, gender, age, and ethnicity
- Independent samples t-tests comparing pre and post-test problem solving scores by time, gender, age, and ethnicity
- Mixed ANOVAs to determine whether problem-solving attitudes differed by demographic variables, and whether these demographic factors interacted with time

Findings

	Time	N	Mean	Median	SD
Approach	Pre	94	**3.67**	3.50	0.702
	Post	42	**3.70**	3.50	0.625
Avoidance	Pre	95	**3.14**	3.00	0.855
	Post	43	**3.23**	3.00	0.934
Personal Control	Pre	96	**4.06**	4.00	0.625
	Post	43	**4.10**	4.00	0.671
Confidence	Pre	96	**4.01**	4.00	0.589
	Post	43	**4.12**	4.17	0.570

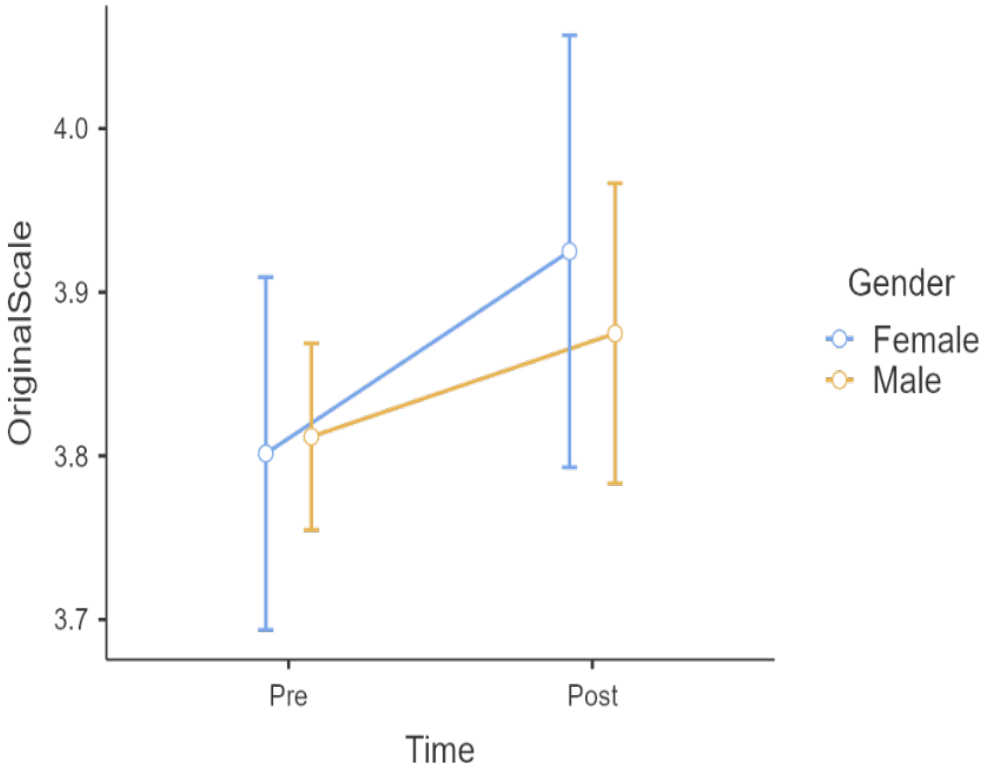
Findings

		Statistic	df	p
Approach	Student's t	-0.255	134	0.799
Avoidance	Student's t	-0.592	136	0.555
PersonalControl	Student's t	-0.310	137	0.757
Confidence	Student's t	-1.028	137	0.306

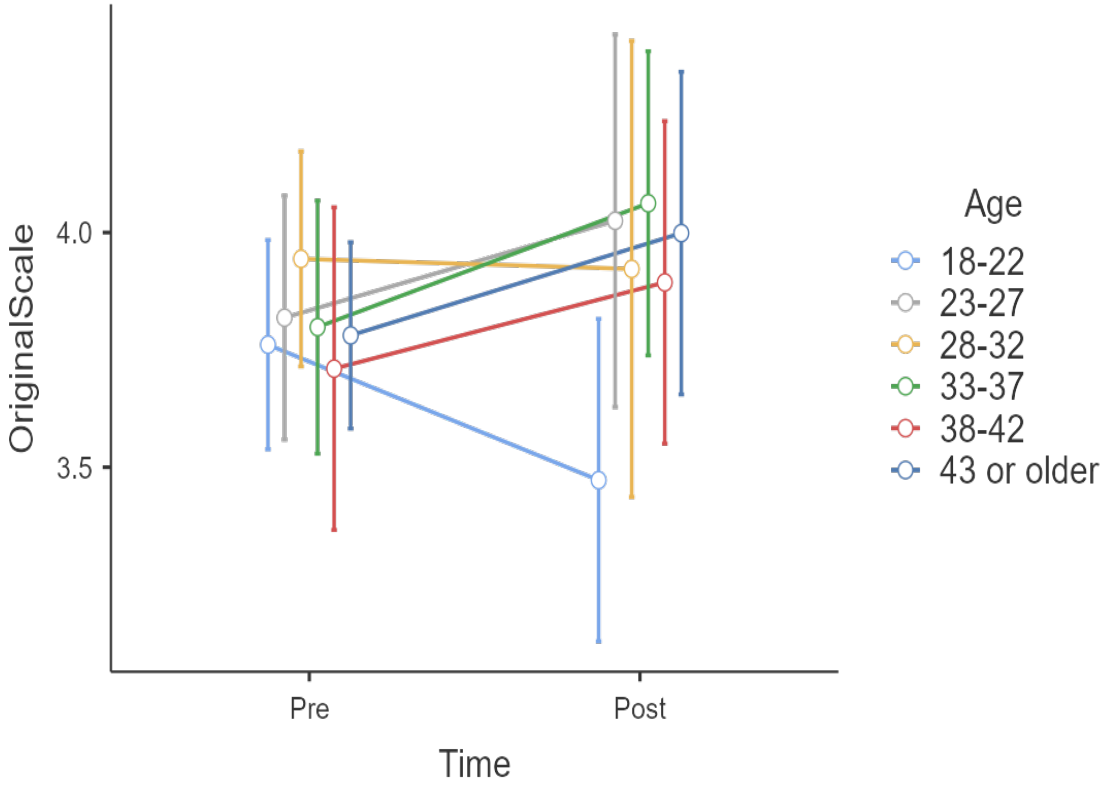
Findings

		Pre-test		Post-test	
		M	Std. Error	M	Std. Error
Age	18-22	3.84	0.10	3.49	0.16
	23-27	3.85	0.12	4.13	0.18
	28-32	3.98	0.11	4.03	0.22
	33-37	3.84	0.12	4.16	0.15
	38-42	3.67	0.16	3.90	0.16
	43 and older	3.79	0.09	4.04	0.16
Gender	Female	3.80	0.11	3.93	0.13
	Male	3.81	0.06	3.87	0.09

Findings



Findings


OriginalScale
4.0
3.5
Pre
Post
Time
Age
18-22
23-27
28-32
33-37
38-42
43 or older

Discussion

- There was no difference in men and women's perceptions of problem solving.
- Overall, students agreed that they persist during problem-solving without being discouraged.
- Age was positively correlated with the avoidance subscale.
- Lower age revealed less adaptive attitudes toward problem-solving (more avoidance);
- Higher age revealed more adaptive attitudes (less avoidance).

Recommendations

- Faculty members can provide more attention to younger students to reduce their propensity to avoid solving problems possibly through introducing low-stakes problem-solving activities within their courses.
- Instructors can assist students by being more intentional about having analysis-type questions and remote hands-on activities in the classroom.

Implications

- Through this study, we see that the design and nature of the courses can encourage the use of problem-solving.
- The results can inform future program design and research on student's perception of themselves as they approach problems and experience failure with problem-solving.

Thank you

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