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INSuRE training course effect on students' research self-efficacy

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INSuRE Background

The Information Security Research and Education (INSuRE) project is a collaborative network that includes National Centers of Academic Excellence (CAE-Rs) universities, various government agencies, and students who are interested in cybersecurity research. A component of INSuRE is a course that is unlike traditional courses, in which it exposes students to a research traineeship that allows them to work on real unclassified cybersecurity problems, work in a team, interact with experts, get mentored by a technical director (TD) from a United States government agency, and experience performing some or all of the aspects of the research process (Chong, Dark, Bishop, & Linger, 2015).

Research Question

What is the extent of the students' research self-efficacy change before and after the INSuRE training course?

Research Self-Efficacy Definition

A judgment of one's ability to perform particular research tasks (Bieschke, Bishop, & Garcia, 1996).

Pilot Study

Conducted a pilot pre/post research self-efficacy study.

- Participants
  - 17 students completed the pre/post survey
  - Students were members of the INSuRE Fall 2016 course
  - Average age 25.76 (SD=4.87) with a range of 20 to 36
  - 13 Males
  - 4 Females
  - 12 Graduate students
  - 5 Undergraduate students
  - 8 CAE-R universities
- Instrument
  - 100-point Likert scale surveys (0=complete uncertainty and 100=complete certainty)
  - Cronbach alpha for pre- and post-surveys = .96
- Analysis method
  - Nonparametric - Wilcoxon Test

(Sherman, Dark, Chan, Chong, et al., in press)

Analysis and Results

Table 1 Students' research self-efficacy before and after INSuRE training course.

	Pretest	Posttest
N	17	17
Mean	73.56	83.27
Median	76.33	86.83
Standard dev	11.73	11.10
Wilcoxon Test	Z=-2.58	
P-Value	<.05**	

Note. *p<.05. **p<.01. ***p<.001. ****p<.0001. (Sherman, Dark, Chan, Chong, et al., in press)

Table 2 Male and female students' research self-efficacy before and after INSuRE training course.

	Males		Females	
	Pretest	Posttest	Pretest	Posttest
N	13	13	4	4
Mean	76.18	84.33	65.04	79.81
Mean difference	8.15		14.77	
Median	77.17	86.83	68.58	83.88
Standard dev	10.52	7.81	12.82	19.80
Wilcoxon Test	Z=-2.41		Z=-1.46	
P-Value	<.05*		>.05	

Note. *p<.05. **p<.01. ***p<.001. ****p<.0001.

Discussion and Conclusion

- Students' research self-efficacy improved and the gain was found to be statistically significant (Sherman, Dark, Chan, Chong, et al., in press).
  - Students responded to an open ended question on their positive experiences in the INSuRE course that influenced their research self-efficacy. The top response was based on having TD and faculty guidance while working on their research project.
- Males had a higher research self-efficacy compared to females, and the research self-efficacy change for males was found to be statistically significant.
  - The significance could be due to males having more participants than females.
  - Lower female self-efficacy could be due to a large decrease of a participant's research self-efficacy from pretest to posttest. The participant was not considered an outlier.

This research is a part of the Information Security Research and Education (INSuRE) project. INSuRE is a partnership between successful and mature Centers of Academic Excellence in Information Assurance Research (CAE-R) and the National Security Agency (NSA), the Department of Homeland Security and other federal and state agencies and laboratories to design, develop and test a cybersecurity research network. INSuRE is a self-organizing, cooperative, multi-disciplinary, multi-institutional, and multi-level collaborative research project that can include both unclassified and classified research problems in cybersecurity.

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