Quantitative Analysis of Perceived Barriers in Implementing Course-Based Research Experiences

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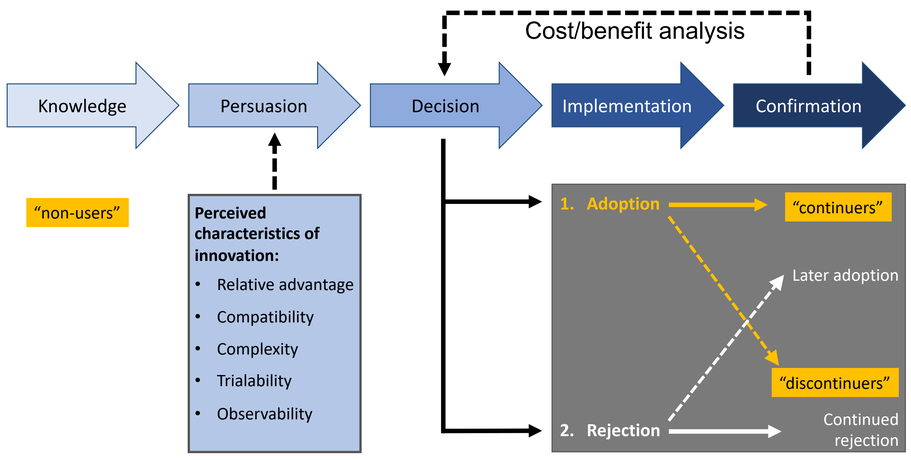
Theoretical Framework

Rogers' innovation-decision process (IDP) framework

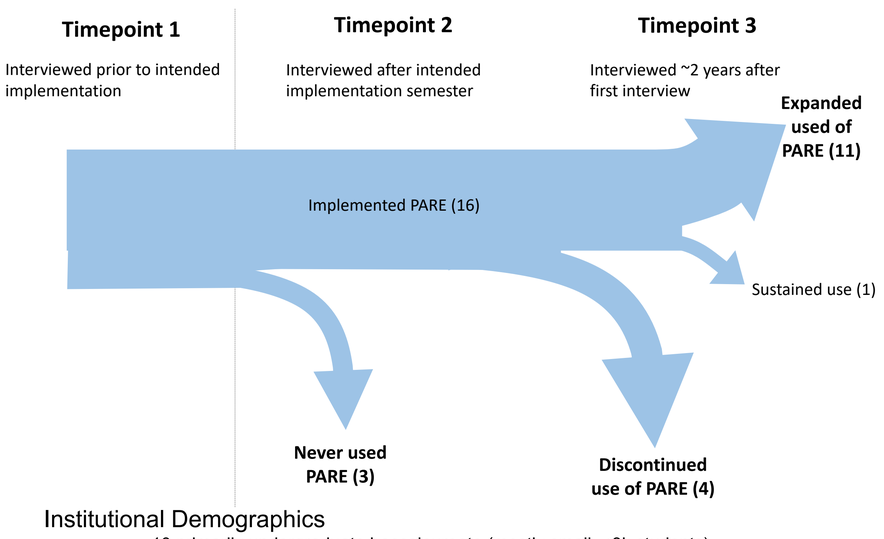


Genné-Bacon et al, 2020- Adapted from Rogers, 2003

Prior Qualitative Work

Longitudinal interviews:

19 "interested" instructors (expressing interest in implementing the short Prevalence of Antibiotic Resistance in the Environment, PARE, CURE)



Institutional Demographics

10 primarily undergraduate baccalaureate (mostly small: <3k students)
5 Community colleges
4 large research-intensive
10 public, 9 private

Prior Findings:

- The majority of "interested" instructors implemented at least once
- The majority had expanded the experience by Timepoint 3
- 4/4 "discontinuers" experienced a disruption to their teaching
- Instructors
- "expanders" express more compatibility themes and less complexity themes than non-expanders

Questions Raised:

- Is institution type a predictor of CURE continuance?
- Is CURE experience a predictor of continuance?
- What other factors might predict long term CURE adoption?

Design Quantitative Survey

- 35 instructors, no CURE experience, 66 tracking interviews
- Coded for persuasion themes

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Write items based on literature review & interview coding themes

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Extensive expert review of items based on theory

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Cognitive interviews with target population
Refine survey items

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Final Survey: 53 "persuasion" theme items plus demographic Qs

Pilot survey for power analysis (50 respondents)

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Deploy survey large-scale
410 respondents

Final Survey Structure:

- 21 "complexity" items
- 18 "compatibility" items
- 14 "relative advantage" items
- Demographic questions
- CURE definition questions
- CURE experience questions (IDP stage)

Survey Respondents

Demographic/independent variables

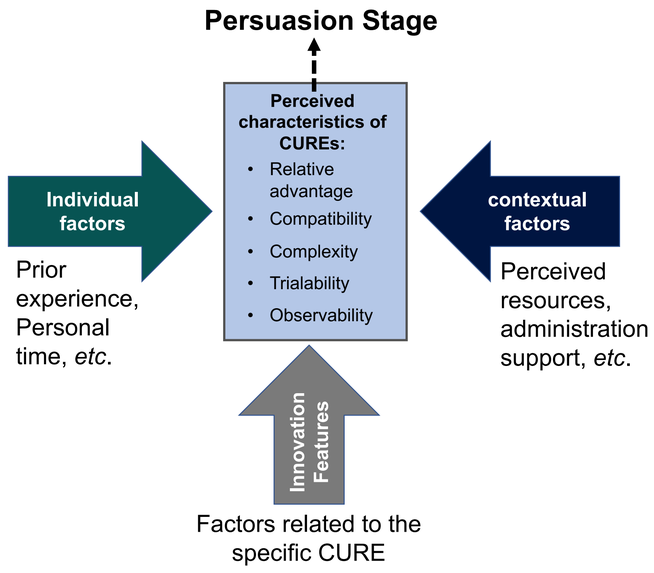
Institution Type	N
Associate	84
Baccalaureate	125
Master's	76
Doctoral	89
Job Stability	**N**
Full-time	331
Part-time	76
Long-term contract/tenure possible	301
Not possible	101

Outcome/dependent variables

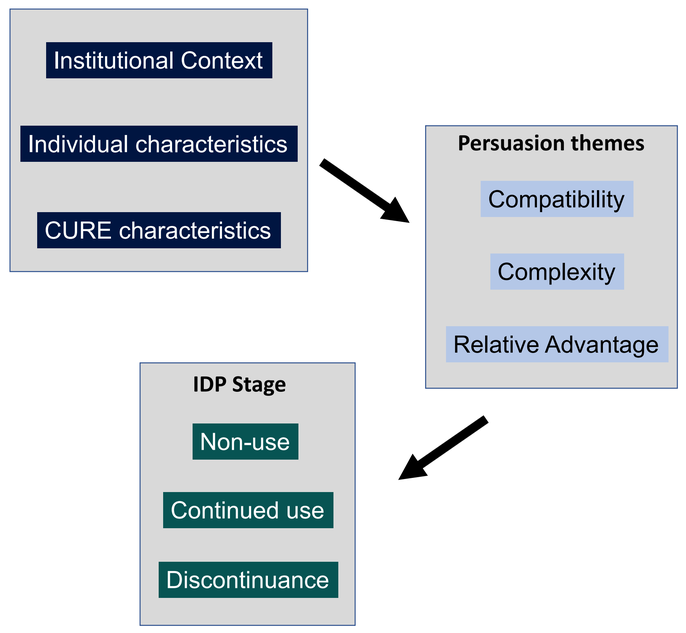
IDP Stage	N
Non-user	108
Continuer	217
Discontinuer	85
Item scores	
Complexity	
Compatibility	
Relative Advantage	

Exploratory Factor Analysis of Persuasion Categories

Exploratory factor analysis of the complexity, compatibility, and relative advantage scales revealed interesting sub-structures, including a divide between institutional, course, and personal compatibility.



Identify relationship between demographic, perception, and IDP variables: What are the drivers of IDP stage?



Key Findings to Date:

- Perceived CURE "compatibility" (*not* "complexity") is strongest single predictor of continuance (IDP stage) as indicated by multiple multinomial regression
- Individual regressions indicated complexity, compatibility, and relative advantage are all significantly correlated with IDP stage.
- Instructors at associate's dominant institutions were significantly more likely to be discontinuers or non-users compared to other institution types.
- These instructors had significantly lower "compatibility" scores.

Differences in Perception Categories

Persuasion theme	IDP Stage	Mean (sd)	One-Way ANOVA
Complexity	Continuer	-0.104 (0.501)	Df - 2 Sum Sq - 11.54 Mean Sq - 5.770 F value - 23.65 Pr(>F) - 1.92e-10** *Post-hoc:* *Continuer different from both*
	Discontinuer	0.188 (0.496)	
	non-User	0.261 (0.477)	
Compatibility	Continuer	0.881 (0.487)	Df - 2 Sum Sq - 38.58 Mean Sq - 19.289 F value - 84.17 Pr(>F) - <2e-16** *Post-hoc:* *All differ from one another*
	Discontinuer	0.484 (0.450)	
	non-User	0.166 (0.483)	
Relative Advantage	Continuer	1.003 (0.488)	Df - 2 Sum Sq - 9.50 Mean Sq - 4.752 F value - 20.41 Pr(>F) - 3.56e-09** *Post-hoc:* *Continuer different from both*
	Discontinuer	0.753 (0.436)	
	non-User	0.665 (0.506)	

Persuasion theme	Job Stability	Mean (sd)	T-test
Complexity	Full time	0.024 (0.520)	t = -2.5492, df = 113.42, p-value = 0.01213*
	Part time	0.190 (0.511)	
Compatibility	Full time	0.656 (0.575)	t = 4.1968, df = 129.21, p-value = 4.999e-05**
	Part time	0.390 (0.481)	
Relative Advantage	Full time	0.867 (0.506)	t = 0.71047, df = 113.04, p-value = 0.4789
	Part time	0.822 (0.500)	

Persuasion theme	Tenure Track	Mean (sd)	T-test
Complexity	Yes	-0.009 (0.518)	t = 4.4373, df = 187.5, p-value = 1.551e-05**
	No	0.238 (0.471)	
Compatibility	Yes	0.674 (0.558)	t = -4.0872, df = 172.96, p-value = 6.673e-05**
	No	0.413 (0.554)	
Relative Advantage	Yes	0.875 (0.514)	t = -1.0005, df = 186.56, p-value = 0.3184
	No	0.819 (0.469)	

Persuasion theme	Institution Type	Mean (sd)	One-Way ANOVA
Complexity	Associate	0.158 (0.515)	Df - 3 Sum Sq - 1.30 Mean Sq - 0.4328 F value - 1.606 Pr(>F) - 0.188
	Doc	0.018 (0.495)	
	Master	0.070 (0.583)	
	Baccalaureate	0.008 (0.497)	
Compatibility	Associate	0.330 (0.463)	Df - 3 Sum Sq -11.48 Mean Sq - 3.828 F value - 12.69 Pr(>F) - 6.55e-08** *Post-hoc:* *Doc-Associate* *PUI-Associate* *PUI-Master* **Master - Associate/Doc* *~trending*
	Doc	0.755 (0.513)	
	Master	0.547 (0.621)	
	Baccalaureate	0.758 (0.580)	
Relative Advantage	Associate	0.755 (0.466)	Df - 3 Sum Sq - 1.11 Mean Sq - 0.3697 F value - 1.441 Pr(>F) - 0.231
	Doc	0.912 (0.434)	
	Master	0.860 (0.510)	
	Baccalaureate	0.855 (0.574)	

References

Rogers, E. M. 2003. Diffusion of Innovations, 5th ed, vol. Simon and Schuster, New York.

Genné-Bacon, J. Wilks, and C. Bascom-Slack, *Uncovering Factors Influencing Instructors' Decision Process When Considering Implementation of a Course-Based Research Experience.* CBE life sciences education 19 (2020).