



Industry/University  
Cooperative  
Research Centers

***A Multivariate Study of Graduate Student  
Satisfaction and Other Outcomes Within  
Cooperative Research Centers***

***Thesis Research***

***by***

***Jennifer S. Schneider***

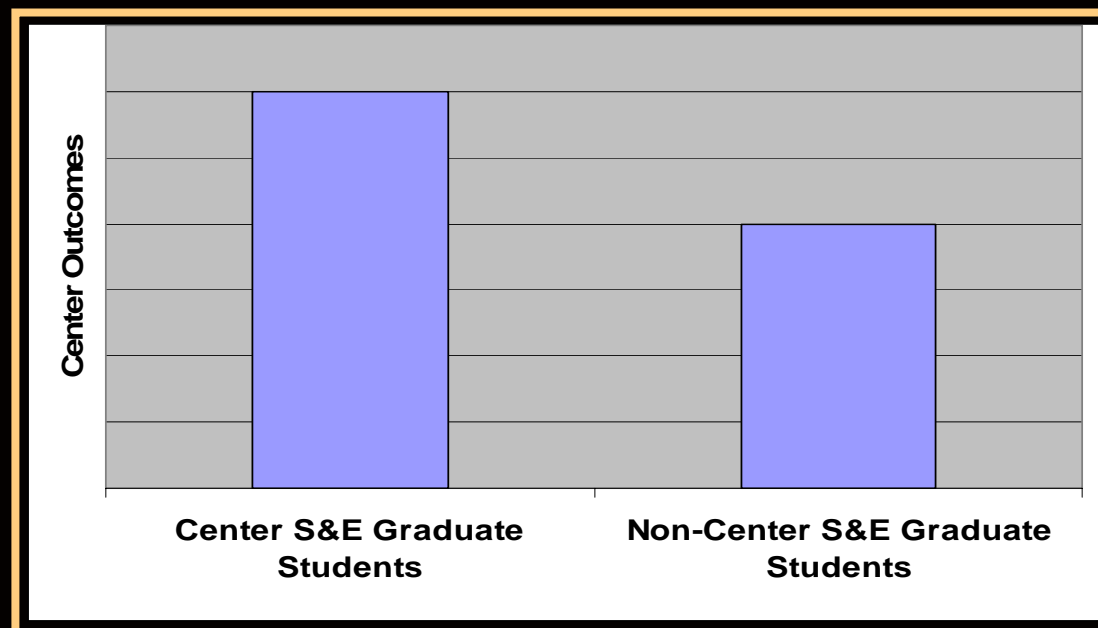
***& Denis O. Gray***

***North Carolina State University***

# Past Research

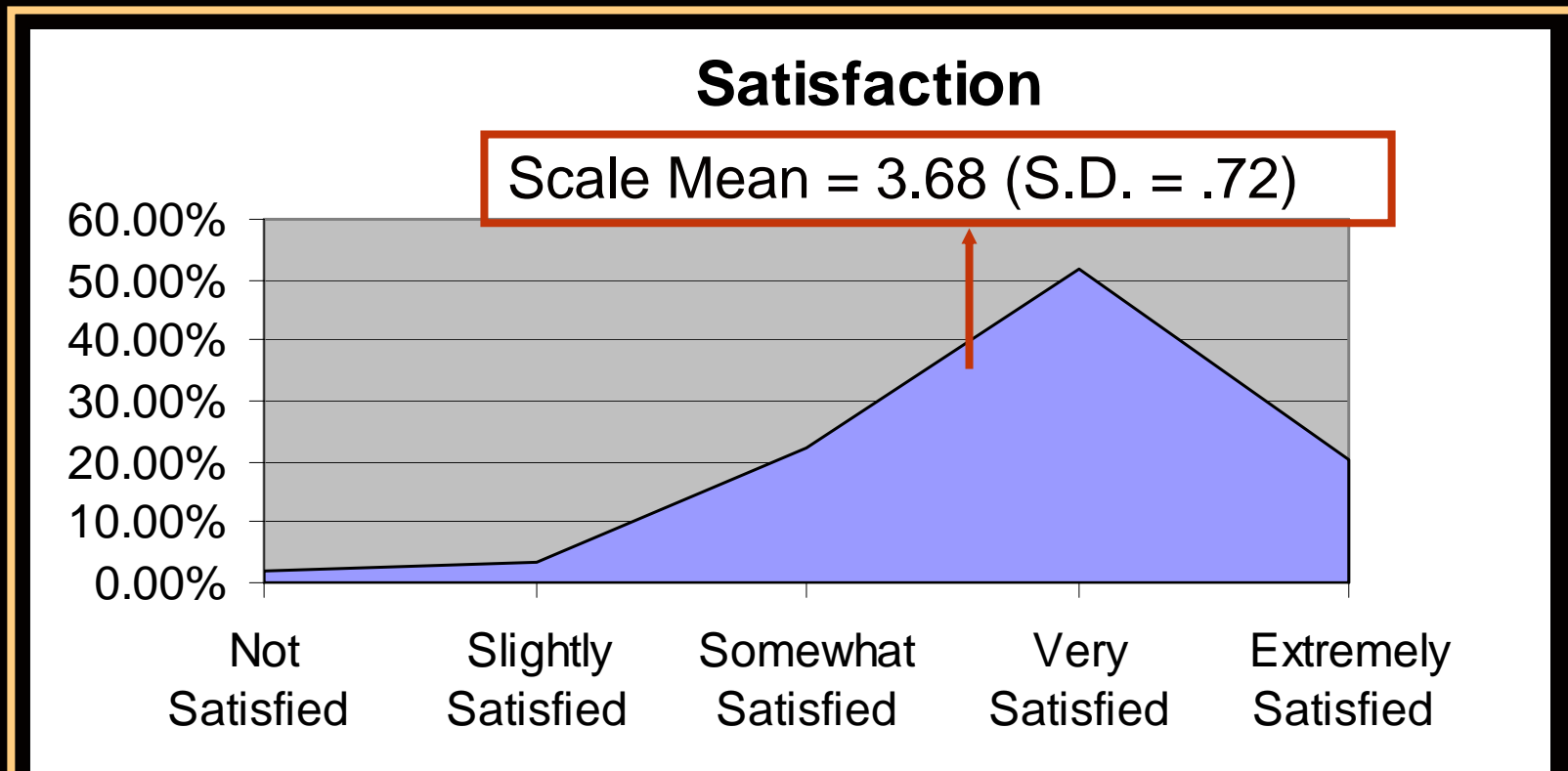
- I/UCRCs have a positive impact on student's training (e.g. Scott, C., Schadd, D. & Brock, D. (1991))
  - Center alumni were rated superior in job performance, being more prepared, and needing less training when hypothetically compared to their organizations' peers by themselves and their supervisors (Ailes, Roessner, & Feller , 1997; Parker, 1997; Fitzsimmons, Grad, & Lal, 1996; Scott, Schaad, & Brock, 1991)

Illustration  
of a mean  
difference



# Assumptions

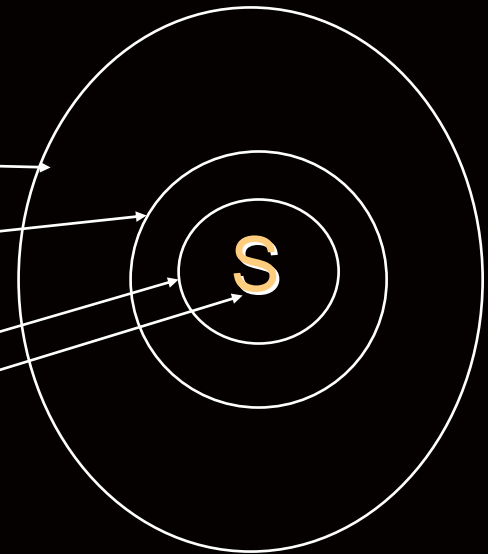
- The training experience provided by individual centers varies
- Those differences have the potential to affect student outcomes



# *Key Question*

To what extent are these differences attributable to:

- Center-level factors
- Research group-level factors
- Advisor/Committee-level factors
- Individual differences



# *Purpose of Research*

- To explore benefits, experiences, and satisfaction of current graduate students in cooperative research centers
- To identify key center mechanisms needed to achieve those educational benefits

# *Research Questions*

- What student and/or center characteristics are related to graduate students' ...
  - satisfaction with their center experiences?
  - perceived benefits (such as Advanced Technical and Problem Solving Skills and Soft Skills)?
  - scholarly achievements (e.g.: intellectual property events, publications with industry)?
  - organizational commitment?

# Critical Measures

## Center Experiences

- *Hypothesized*
    - Multidisciplinary
    - Team based
    - Experiential
    - Technical
    - Soft Skills
  - *Results*
    - Multidisciplinary (4 items)
      - Scale Mean = 2.98; S.D. = 0.58
      - *Example Item: “Working/interacting regularly with faculty from other disciplines”*
    - Experiential (7 items)
      - Scale Mean = 3.2; S.D. = 0.41
      - *Example Item: ““Hands-on” learning/learning-by-doing approach”*
- Scale: “My involvement in the Center includes...  
1 = “Strongly Disagree” to 4 = “Strongly Agree”

# Critical Measures

- Formal Training Mechanisms (7 items)
  - *Example Item: Involvement with... "Scientific seminar series featuring outside speakers"*
- Technical Project Involvement (5 items)
  - *Example Item: "Developing the methods and procedures used in the project"*
- Advanced Technical and Problem Solving Skills (7 items)
  - *Example Item: Proficiency in... "Computer, technical, and/or laboratory equipment" skills*
- Soft Skills (4 items)
  - *Example Item: Proficiency in... "Leadership" skills*



# Individual Center Mechanisms to Outcomes

## Predictors

### Individual Characteristics

- Gender, Age, Ethnicity, Citizenship

### Student Characteristics

- Funding, Department, Degree sought, GPA, Years at University, Terminal Degree, Job experience

### Center Mechanisms

- Center Experiences
- Formal Center Training Activities
- Technical Project Involvement
- Thesis/Dissertation Committee

Interactions: Industry, Center Director, Advisor, Students, etc.

Individual Center

## Process/Outcomes

Satisfaction

Perceived Benefits

–Advanced Technical and Problem Solving Skills

–Soft Skills

Organizational Commitment

Scholarly Achievement

Competitive Advantage

Career Goals

# *Methodology*

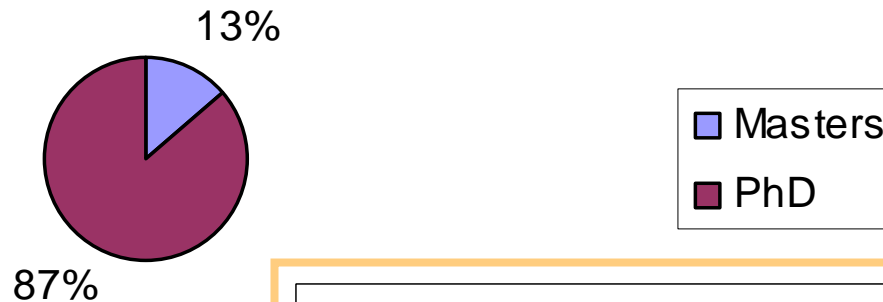
- Design
  - Predictive study: Multivariate regression
  - Web-based questionnaire
- Response Rate
  - Number of Centers: 34 (81%)
  - 528 sent out
  - 190 total (37% response rate)
- Analysis
  - Descriptive statistics
  - Exploratory factor analyses
  - Multivariate regressions (OLS, Logistic)

# Degree and Thesis Topic

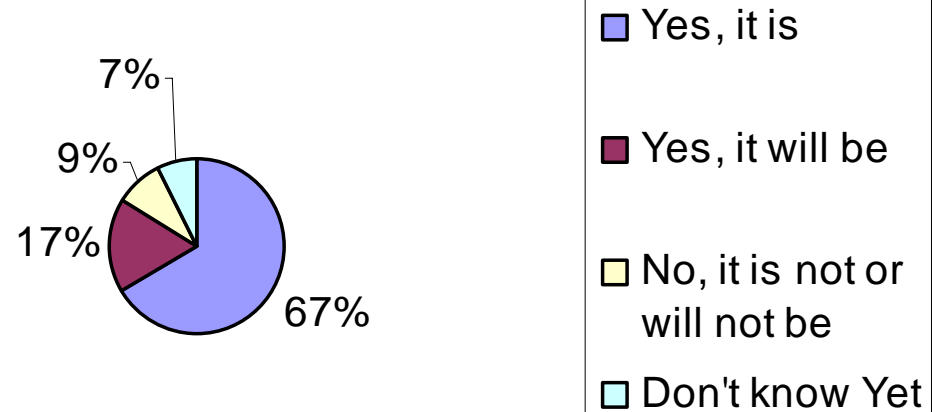


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Highest degree student will be pursuing



Thesis/dissertation based on a  
Center project

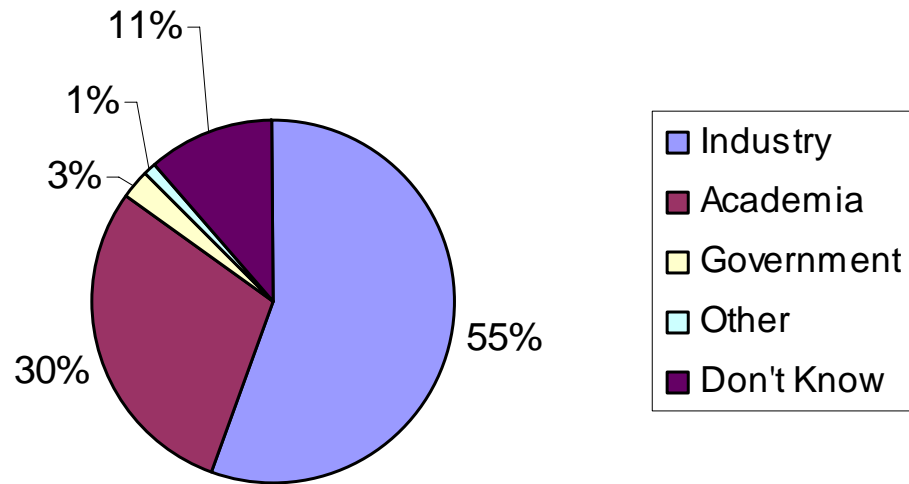


# Career Goals



Industry/University  
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## Current Career Goals





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# *Predicting Outcomes*

***\*\*Regressions tested at a .10 significance level***

# *Testing the Level of Effects*

- Intra-class correlation was used to test whether variance in various predictors was explained by center affiliation (e.g., were students within centers more alike than students across centers)
- This was not demonstrated
  - » Center-level groupings did not explain variance in key IVs
  - » Thus, cannot test for center-level effects
- All results represent individual-level prediction

# *Regressions: Satisfaction*

	R Square = .44	
Satisfaction	<i>B</i>	Sig.
Gender (Male)	0.15	0.01
Interactions: Advisor	0.20	0.00
Interactions: Industry Members	0.16	0.01
Technical Project Involvement	0.12	0.03
Multidisciplinary Center Experiences	0.22	0.01
Experiential Center Experiences	0.27	0.00

# Regressions: Organizational Commitment

	R Square = .40	
Organizational Commitment	B	Sig.
Number of Departments on Thesis/Dissertation Committee: One Department vs. No Committee yet	0.19	0.01
Number of Departments on Thesis/Dissertation Committee: One Department vs. Two or More Departments	0.25	0.00
Interactions: Center Director	0.13	0.05
Multidisciplinary Center Experiences	0.19	0.01
Experiential Center Experiences	0.35	0.00



# *Regressions: Self-Reported Soft Skills*

	R Square= .26	
<b>Self-Reported Soft Skills</b>	<b>B</b>	<b>Sig.</b>
Citizenship	0.17	0.01
Years at University	0.23	0.01
Interactions: Industry Members	0.15	0.03
Interactions: Thesis/Dissertation Committee	0.12	0.07
Technical Project Involvement	0.28	0.00



# *Regressions: Self-Reported Advanced Technical and Problem Solving Skills*

	R Square = .36	
<b>Advanced Technical and Problem Solving Skills</b>	<b>B</b>	<b>Sig.</b>
Years at University	0.17	0.06
Number of Departments on Thesis/Dissertation Committee: One Department vs. No Committee yet	0.22	0.01
Number of Departments on Thesis/Dissertation Committee: One Department vs. Two or More Departments	0.16	0.08
Interactions: Thesis/Dissertation Committee	0.13	0.05
Technical Project Involvement	0.23	0.00
Multidisciplinary Center Experiences	0.27	0.00

# *Regressions: Competitive Advantage*

Competitive Advantage	R Square = .23	
	<i>B</i>	Sig.
Experiential Center Experiences	0.43	0.00
Total Center Funding	-0.16	0.02

# *Regressions: Scholarly Achievements*

	<b>Nagelkerke R Square = .24</b>	
<b>Intellectual Property Events</b>	<b>Odds Ratio</b>	<b>Sig.</b>
Years at University	1.41	0.02
Funding	1.91	0.08
Visited Industry	4.79	0.00

	<b>Nagelkerke R Square = .19</b>	
<b>Publications with Industry</b>	<b>Odds Ratio</b>	<b>Sig.</b>
Visited Industry	2.19	0.03
Advanced Technical Formal Training Mechanisms	1.60	0.04

# *Preliminary Conclusions*

- There is considerable amount of variability across center students
  - Characteristics
  - Experiences
  - Outcomes
- Student experiences predict outcomes but center groupings do not
  - Lack of variability across centers; effects may lie at research group and/or advisor level
- Consistent and Powerful Outcome Predictors
  - Multidisciplinary Center Experiences
  - Technical Project Involvement
  - Experiential Center Experiences
- Intriguing Predictors
  - Interactions with Industry (Satisfaction)
  - Interactions with Center Director (Organizational Commitment)
  - Interactions with Advisor (Satisfaction)

# *Next Steps*



- Consider using some components of the questionnaire to assess student outcomes on an ongoing basis