Broader Impacts, Institutional Support, and Faculty Retention

NABI Summit 2016
University of Pennsylvania
Philadelphia, PA
Speakers

- **Diane Rover**, University Professor, Electrical and Computer Engineering
- **Megan Heitmann**, Assistant Director, Strengthening the Professoriate at ISU (SP@ISU)
- **Mack Shelley**, Department Chair, Political Science; Professor, Political Science and Statistics
- **Lisa Larson**, Professor, Psychology
- **Susan Renoe**, Director, Broader Impacts Network, University of Missouri
Objectives of the Session

Learn about:

- Goals shared by the broader impacts, engaged scholarship, and career-life balance communities
- Potential relationships between institutional support, BI work, and STEM faculty retention
- Opportunities for institutions and these communities to strengthen efforts to build and retain a diverse STEM faculty
Agenda

• Overview of fall 2015 workshop
• Overview of research project and findings
• Faculty perspectives on BI work
• Addressing faculty needs through institutional support for BI
Motivation for the Fall 2015 Workshop

- Need for holistic envisioning of STEM faculty careers from multiple perspectives
- Understanding factors affecting STEM faculty success
- Enhance full participation and engagement in STEM academic careers by all groups
- Enhance infrastructure to support faculty
- Share and stimulate promising practices
- Develop recommendations for institutional action

www.spisu.iastate.edu/stem-fit/workshop
Workshop Overview

• Date: October 14-15, 2015
• Location: Evanston, Illinois
• Organized by Iowa State University with support from the NSF Career-Life Balance Initiative
• Co-sponsored by the National Alliance for Broader Impacts
• Audience: academic administrators, faculty, and staff who are involved in faculty development, research programs, and institutional policymaking
• Number of participants: 61
Workshop Sessions

- Understanding and Recognizing Broader Impacts Work at Multiple Levels
- Exploring the Barriers and Benefits of Engaged Scholarship for Faculty Retention
- Career-Life Balance: Models and Mechanisms of Institutional Support
- Self Determination Theory, COACHE, and Faculty Outcomes in Higher Education: Institutions and Individuals
- Constructing Frameworks for Faculty Success
- Investing in STEM Academic Careers
  - Joan Frye, Acting Deputy Office Head, OIA, NSF
- Implementing Frameworks at Your Institution
- Refining Institutional Plans
STEM Faculty Framework Themes

- Administrative/Leadership Support
  - Ex: Connection between institutional policies and departmental practices; leadership training
- Department Culture
  - Ex: Sense of belonging in department, institution, etc.
- P&T Support
  - Ex: Effective mentoring; transparency/clarity
- Research Support
  - Ex: Breadth of research work and needs of researchers
STEM Faculty Framework Themes

• Accessible Career-Life Balance Resources
  • Ex: Access to work-life policies
• Recognition
  • Ex: Types of scholarship and impact
• Using Data for Intentional Institutional Change
  • Ex: Department climate; evidence-based approaches to meeting needs
• Respect for the Integration of Professional and Personal Selves
  • Ex: Valuing individual identities, strengths, and interests
Self Determination Theory, COACHE, and Faculty Outcomes in Higher Education

Lisa M. Larson
Mack C. Shelley
Sandra W. Gahn
Matthew Seipel
Overview

- ISU COACHE survey through the lens of Self-Determination Theory (SDT)
  - Overview of SDT
  - Introduction of constructs and outcome measures for structural equation modeling (SEM)
  - Sample characteristics
  - SEM results
  - Results from non-tenure track faculty
Self-Determination Theory

- Meta-theoretical approach to motivation and personality
- 3 basic psychological needs:
  - Competence
  - Relatedness
  - Volitional Autonomy
Institutional Supports (e.g. Dean, Research, Worklife balance)

- Rank
- Gender
- STEM/non-STEM

Global Satisfaction

Autonomy
Relatedness
Competence

Satisfaction with Teaching/Service
Harvard COACHE Survey

- Web-based faculty satisfaction survey (Benson, Mathews, & Trower, 2014)
  - Administered to 250 institutions since 2003
- Approx. 170 five-point Likert items and 25 min mean completion time
  - Variance due to branching based on rank
- Asks about various aspects of participants’ work (e.g., teaching, service, research, climate, satisfaction, etc.)
- Also collects a host of demographic data
Deriving Constructs from COACHE Items

- COACHE themes

- Some of our constructs may be similar, but are independent

- Development of constructs
Perceived Needs according to Self-Determination Theory

- Perceived autonomy
- Perceived competence
  - Measured as competence time spent
- Perceived relatedness
Perceived Needs according to Self-Determination Theory

Relatedness Example Item:

Please rate your level of satisfaction or dissatisfaction with the following statement:

How well you fit in your department (e.g., your sense of belonging in your department)

Very dissatisfied; Dissatisfied; Neither satisfied nor dissatisfied; Satisfied; Very satisfied; Decline to answer; Not applicable
Institutional Supports

- 11 identified from COACHE survey

Example Item for Research Support Construct:

Please rate your level of satisfaction or dissatisfaction with the following:

The availability of course release time to focus on your research.

Very dissatisfied; Dissatisfied; Neither satisfied nor dissatisfied; Satisfied; Very satisfied; Decline to answer; Not applicable
Institutional Supports

• Examples
  • Work-life balance support
  • Research support
  • Dean support
Outcomes

• Teaching/service satisfaction

• Global satisfaction
Our Sample

- 558 Faculty
  - 126 Assistant
  - 175 Associate
  - 275 Full

- Gender
  - 63.1% Male
  - 36.9% Female

Race/Ethnicity

- 81.4% White (non-Hispanic)
- 12.9% Asian, Asian-American, or Pacific Islander
- 2.7% Hispanic or Latino
- 2.3% Black or African American
- 0.2% American Indian or Native Alaskan
- 0.7% Multiracial
- 0.4% Other
Perceived Autonomy Model
Perceived Autonomy Model
Effect Sizes
(Standardized Regression Coefficients)
Predictors of Perceived Autonomy

Value Standardized Regression Coefficients

- Chair Support
- Dean Support
- Research Support
- Perceived Competence Support
- Work/Life Balance
- Recognition Support
- Evaluation Support
- Faculty Teaching Quality
Predictors of Teaching Service Satisfaction

- Perceived Autonomy
- Research Support
- Evaluation Support
- Perceived Competence Support
- Benefit Support
- Work/Life Balance
- STEM/non-STEM
- Chair Support

Value Standardized Regression Coefficients
Predictors of Global Satisfaction

Value Standardized Regression Coefficients
Significant Indirect Effects for Perceived Autonomy Model

- Perceived Autonomy was a statistically significant mediator of Teaching/Service Satisfaction for:
  - Faculty Teaching Quality \((p=.037)\)
  - Dean Support \((p<.001)\)
  - Research Support \((p<.001)\)
  - Evaluation Support \((p=.017)\)
  - Recognition support \((p=.016)\)
  - Work/Life Balance Support \((p<.001)\)
  - Chair Support \((p<.001)\)
  - Perceived Competence Support \((p=.003)\)
Significant Indirect Effects for Perceived Autonomy Model

- Perceived Autonomy was a statistically significant mediator of Global Satisfaction for:
  - Dean Support ($p<.001$)
  - Research Support ($p=.004$)
  - Evaluation Support ($p=.027$)
  - Recognition support ($p=.026$)
  - Work/Life Balance Support ($p=.004$)
  - Chair Support ($p<.001$)
  - Perceived Competence Support ($p<.001$)
Perceived Competence Time Spent Model
Perceived Competence Time Spent Model Effect Sizes (Standardized Regression Coefficients)
Predictors of Perceived Competence Time Spent

Value of Standardized Regression Coefficients

- Work/Life Balance
- Evaluation Support
- Research Support
- Perceived Competence Support
- STEM/non-STEM
- Chair Support
Predictors of Global Satisfaction
Significant Indirect Effects for Perceived Competence Time Spent Model

• Perceived Competence Time Spent was a statistically significant mediator of Teaching/Service Satisfaction for:
  • STEM/non-STEM ($p<.001$)
  • Chair Support ($p=.007$)
  • Work/Life Balance ($p<.001$)
  • Evaluation Support ($p<.001$)
  • Perceived Competence Support ($p=.007$)
Relatedness Model
Relatedness Model Effect Sizes
(Standardized Regression Coefficients)
Predictors of Teaching Service Satisfaction

- Research Support
- Evaluation Support
- Perceived Competence Support
- Work/Life Balance
- Benefit Support
- Gender
- STEM/non-STEM

Value Standardized Regression Coefficient

- Research Support has the highest value.
- STEM/non-STEM has the lowest value.
Predictors of Global Satisfaction

Value Standardized Regression Coefficient

1. Relatedness
2. Recognition Support
3. Perceived Competence Support
4. Evaluation Support
5. Upper Level Administration
6. Research Support
7. STEM/Non-STEM
8. Work/Life Balance
9. Benefit Support
Significant Indirect Effects for Relatedness Model

- Relatedness was a statistically significant mediator of Global Satisfaction for:
  - Faculty Teaching Quality \((p<.001)\)
  - Evaluation Support \((p=.006)\)
  - Recognition support \((p<.001)\)
  - Work/Life Balance Support \((p=.023)\)
  - Chair Support \((p<.001)\)
  - Benefit Support \((p=.026)\)
Supporting Non-Tenure Track Faculty Satisfaction

Matthew Seipel
Deriving Constructs from COACHE

- Started with environmental supports, SDT needs, and outcome constructs operationalized by Larson, Shelley, & Gahn (2015)
- **Predictors**: Departmental, Administrative, Personal and Family supports
- **Mediators**: Volitional Autonomy, Perceived Relatedness
- **Outcomes**: Teaching/Service Satisfaction, Global Satisfaction
Analyses

• Path analysis
• Cutoff criteria provided by Hu & Bentler (1999) for goodness-of-fit
• Bootstrap tests using bias corrected 95% confidence intervals to test the significance of the mean indirect effects
• 2 (Gender: male vs. female) x 2 (Area: STEM vs. non-STEM) ANOVAs with all constructs
  • No significant main effects or interactions
Partially Mediated Model \[ \chi^2(18, N = 96) = 224, p < .001, \text{CFI} = 1.00, \text{RMSEA} < .01, \text{SRMR} < .01 \]
Fully mediated model $\chi^2(6, N = 96) = 2.80$, $p = .83$, CFI = 1.00, RMSEA < .01, SRMR = .02
Discussion

• Preliminary evidence for utility of SDT as a conceptual framework for NTT faculty
• Mediation hypotheses partially supported
  • Perceived relatedness mediated all relations between the environmental supports and faculty well-being
  • Volitional autonomy only (marginally) mediated path from administrative support to global satisfaction.
Implications for Both Studies for BI Community

- Increasing Relatedness by involvement in BI activities

- Increasing Volitional Autonomy

- Institutional Supports as they directly and indirectly affect Faculty Satisfaction
Faculty panel on Understanding and Recognizing Broader Impacts Work at Multiple Levels

Heidi Appel, University of Missouri
Yarrow Axford, Northwestern Univ.
Susan Renoe, University of Missouri
Julie Risien, Oregon State University
Jack Schultz, University of Missouri
Evan Scott, Northwestern University
Faculty Perspectives on BI Work

- Evan Scott, Assistant Professor of Biomedical Engineering, Northwestern University
Faculty Perspectives on BI Work

- Heidi Appel, Senior Research Scientist in the Bond Life Sciences Center, University of Missouri
Reflection on Faculty Needs and Perspectives

• What have you learned thus far regarding supporting faculty to promote faculty satisfaction and success?
Institutional Supports and Faculty Satisfaction

• Sample COACHE survey items – support constructs
  • **Research support**: support your institution provides you for obtaining externally funded grants
  • **Work/life balance support**: balance between my professional life and my personal/family life
  • **Chair support**: satisfaction with department chair’s stated priorities
  • **Promotion & tenure support**: clarity of the promotion criteria (what things are evaluated) in my department
  • **Interdisciplinary support**: department understands how to evaluate interdisciplinary work
Institutional Supports and Faculty Satisfaction

• What types of BI support do faculty use and benefit from?

• Review the STEM Faculty Success Framework Themes (next slide)
STEM Faculty Success Framework Themes

- Administrative/Leadership Support
- Department Culture
- P&T Support
- Research Support
- Accessible Career-Life Balance Resources
- Recognition
- Using Data for Intentional Institutional Change
- Respect for the Integration of Professional and Personal Selves
Cross-Functional Support for Faculty Success

- Engaged scholarship ↔ BI?
- BI ↔ career-life balance?
- Leverage available supports
- Create new supports
- Needs of researchers

Broader Impacts
Engaged Scholarship
Career-Life Balance
NSF Acknowledgement

This research is funded by National Science Foundation awards IIA-1449187 and HRD-0963584. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.