



Capturing the Dynamics of Non-Traditional Educational Settings: Lessons Learned in Developing Instrumentation for Use in Field-Based Career Development Research

Krystal Hinerman¹, Ennea Fairchild², Jessica L. McKay³, Eric M. Riggs³, Julie Sexton⁴, Harmony Newman²
 (1) Lamar University, (2) University of Northern Colorado, (3) Texas A&M University, (4) University of Colorado Boulder

Introduction

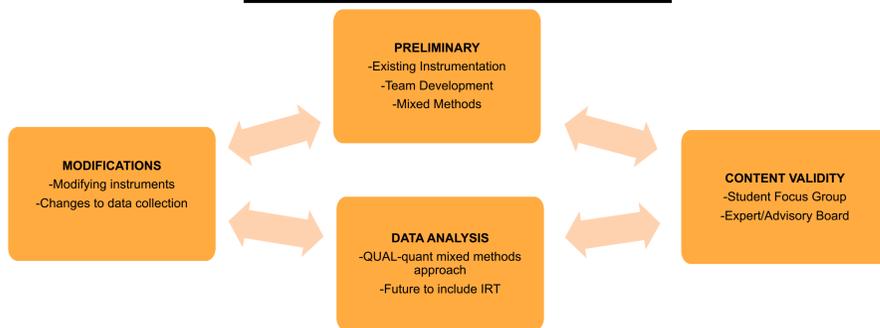
While fieldwork is often a required element for undergraduate students in field science, little research has been conducted to determine how fieldwork impacts students' plans for further study and career aspirations. Because of the dynamic nature of non-traditional educational settings such as geology field stations, developing instrumentation to capture the full range of potential positive and negative impact factors related to career development can be challenging.

Our mixed-method study focused on four multi-week field station programs for advanced undergraduates. Social cognitive career theory (SCCT) was used as the overarching theory to examine how contextual, personal, and behavioral factors relate to student outcomes such as academic and career choices. Structural elements related to the uniqueness of field settings were also considered.

Our developed surveys and interview protocols measured and explored factors related to academic and career path development, allowing us to extend the application of SCCT to non-traditional educational spaces. Using both existing and original scales, our survey measured personal factors (i.e. identity, self-efficacy, interests), behavioral factors (transformative experience), contextual factors (i.e. social climate, sexist experiences), outcome factors (i.e. confidence in selecting and staying in a major, career intent, career paths), and structural factors (i.e. policy, logistics, operations). The follow-up interview protocol was designed for in-depth exploration of these factors.

Pre/post survey and interview data from both students and instructors were analyzed to examine consistency among dual reporters and reporting methods, the interrelatedness of constructs, and comparisons across field sites. Results from the preliminary analysis were used to improve our instrumentation for future application of SCCT research in field settings. Our study includes several lessons learned regarding capturing the multifaceted aspects of non-traditional educational settings and calibrating instrumentation to capture nuances related to constructs such as normalized sexism, perceived inequalities, health and safety, social climate, reporting behaviors, and field station policies.

Development Methods



Multipurpose Instrumentation

Purpose/Goals	Description
Inventory of Sexist Experiences and Social Climate	Capturing an overall descriptive picture of what 'sexist experiences' and 'social climate' look like in non-traditional educational settings.
Social Cognitive Career Theory Modeling	Theory building and extension of SCCT models. Seeing how field experiences relate to personal, behavioral, and career outcomes.
Establish Best Practice Recommendations	Determining which elements are under control of the sponsoring institution and/or field direction can be manipulated to increase inclusivity. Identify 'weak spots' in policy and procedures.
Identify Potential Interviewees	Variables needed to determine critical cases for further participation. Critical cases being those who experienced either sexist experiences and/or hostile climate.

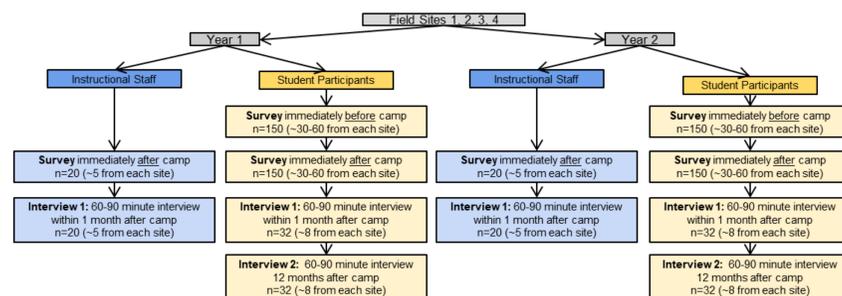
Contact Information and References

For further questions or complete reference list please contact:

Krystal Hinerman email: khinerman@lamar.edu

This project is partially funded by the National Science Foundation under Grants #1761190, #1949614, #1761174, and #1760981. Any opinions, findings, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Data Collection



Instrument Mapping

Domain	Facet	Student		Instructor	Qualitative	
		Pre	Post		Student	Instruct
Personal	Interest (Harackiewicz et al., 2008)	X	X		X	X
	• Value					
	• Feeling					
Behavioral	Science Identity (Pugh et al., 2010)	X	X		X	
	Science Self-Efficacy	X	X			
	Transformative Experience (Pugh et al., 2010)	X	X		X	
Contextual	• Motivated Use					
	• Expansion of Perception					
	• Experiential Value					
	Social Climate (Clancy et al., 2014)	X	X	X	X	X
	• Sense of Community					
	• Belongingness					
	• Peer/Instructor Interaction					
	• Differential Treatment					
	• Performance Rating					
	Sexual Harassment	X	X	X	X	X
• Two Part – Inventory/Detail						
• Hostile						
• Benevolent						
• Personal (e.g. happened to me)						
• Vicarious (e.g. witness happening)						
• Structural: (who, what, when, where)						
• Reporting Practices						
Structural		~	X	X	X	
• Facilities (ex: restrooms, sleeping areas)						
• Training (ex: University, field procedures)						
• Policy (ex: sexism, drug/alcohol policy)						
• Logistic (ex: task, dorm assignment)						
• Scheduling (ex: quiet time, duration)						
• Supervision (ex: responsibility delegation)						
• Accountability (ex: assigning grades)						
• Field & Online Environments						
Outcomes	Confidence: Selecting/Staying in Major	X	X		X	
	Intent to Pursue	X	X		X	
	Academic and Career Paths	X	X		X	
Demo-graphics	Background	X	X	X		
	Academic	X	X	X		

Lessons Learned

Issue	Problem	Solutions
Calibrating/Under Reporting	<ul style="list-style-type: none"> Incidents of discriminatory behavior not reported on survey, revealed in interview Report discriminatory behaviors on one area of survey, but conflict with another section 	<ul style="list-style-type: none"> Modify vocabulary to include more comprehensive vocabulary (ex: sexting; unwanted invitation to establish a sexual relationship vs. relationship; treated badly for refusing to have [sex] vs [have sex or engage in other forms of sexual activity]) Added examples of more subtle behaviors (ex: males always carry equipment) Identifying normalized sexism
Content Validity	<ul style="list-style-type: none"> Health and safety issues were not directly included in the survey or interview protocol but surfaced through interviews (ex: drinking, heat exhaustion, restroom facilities) 	<ul style="list-style-type: none"> Added interview questions regarding alcohol use, restrooms, physical requirements/abilities. Broadened interview questions to be more open ended (ex: bad experiences based on gender - to - bad experiences)
Adaptation for Setting /Instructional Modality	<ul style="list-style-type: none"> Between Year 1 and Year 2, the instrumentation had to be modified from field setting orientation to include modified field program settings such as online 	<ul style="list-style-type: none"> Vocabulary modified to include variety of settings (ex: received unwanted and inappropriate [behavior] via phone or computer including written and/or oral communication) Added online learning skills-based items (ex: confidence in operating in online environment, self-directed learning) Added direct questions about how format/structure of online learning effected experience and outcomes
Response Rates	<ul style="list-style-type: none"> Overall ~24% to 39% response rate 23 match pretest/posttest student Posttest: Student n=28; Faculty n=21 Change in participant sites 	<ul style="list-style-type: none"> Ask interviewees for ideas to increase response rates Plans to be in field before Covid-19 Gaining more buy-in through meeting with directors, follow-up emails
Dual Rater Agreement	<ul style="list-style-type: none"> Notable differences found between instructor perceptions and student perceptions (ex: students report lower social cohesion, higher gender-related tension, higher discriminatory evaluation) 	<ul style="list-style-type: none"> Changes in vocabulary may lessen Conducting statistical analysis on larger sample to determine extent of differences Continue mixed methods analysis comparing qualitative write-in or interview responses to determine if differences lie only in quantitative survey responses or also in reported experiences

Next Steps in the Path Forward

At the time of this presentation, our project is in the process of employing the resulting modified instrumentation from 'lessons learned' in Year One to collect Year Two data. Preliminarily, despite the additive challenges of operating during a worldwide pandemic, the response rate has thus far increased.

Moving forward in purpose to develop valid instrumentation for researching SCCT factors as related to undergraduate student career development and creating inclusive non-traditional educational settings, we propose the following steps:

- Continued comparative mixed methods analysis expanded to include cross-field settings comparisons (ex: virtual vs face-to-face vs hybrid);
- Inclusion of psychometric analysis (ex: IRT and structural equation modeling) to quantitatively evaluate performance of single items, multi-item constructs, the relationship between constructs, and the validity across different groups;
- Expansion of our project to include a Year Three data collection, which will likely introduce another unique blend of field experience settings to include elements of more traditionally styled field programs and modifications developed in response to Covid-19;
- Continued waves of data collection to conduct mixed-methods and psychometric analysis on instrument validity across time and for the purposes of evaluating longer term effects.
- Continued collaboration with other research teams to define/re-define allusive concepts such as normalized sexism and transformative experience – and refine how those concepts are captured;
- Continued stakeholder engagement to emphasize the importance of participating in projects such as this which serve to better understand and promote inclusive practices.