Paper Title Exploring Organizational Climate for Teaching in Postsecondary Settings: The Development and Validation of the Survey of Climate for Instructional Improvement

Author(s) Emily Marie Walter, California State University - Fresno; Andrea L. Beach, Western Michigan University; Cody Tyler Williams, Western Michigan University; Charles R. Henderson, Western Michigan University; Ivan Ceballos Madrigal, California State Universit

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Objectives

This paper examines the development and validation of the Survey of Climate for Instructional Improvement (SCII, pronounced "ski"). SCII is a 31-item Likert-scale instrument that measures five aspects of organizational climate for instructional improvement: collegiality, leadership, resources, respect for teaching, and organizational support. The goal of the paper is to describe: (a) our development process, (b) steps in validation, and (c) patterns in the data from 713 instructors from 57 different departments within four higher education institutions in the United States.

Perspective

Most faculty have knowledge of evidence-based instructional practices and access to the resources to carry them out. Despite this, efforts to transform postsecondary instruction have had only modest success (e.g. AAAS, 2012). The underlying reasons for modest employment of evidence-based practices may be related to *institutional environments and structures* (Beach, Henderson, & Finkelstein, 2012; Henderson, Beach, & Finkelstein, 2011).

One measure of institutional environment is climate. Climate is the "shared, subjective experiences of organizational members that have important consequences for organizational functioning and performance" (Ashkenazy, Wilderom, & Peterson, 2001, p. 1). Climate can be seen as an individual (psychological) construct or as a property of the organization (Kozlowski & Klein, 2000) when individual perceptions are aggregated to the group level and consensus can be demonstrated (Dansereau & Alluto, 1990; James, Demaree & Wolf, 1993; James & Jones, 1974; Kozlowski & Hults, 1987). Since our greater research project focuses on the influence of institutional environments on postsecondary teaching practices (see also Authors, 2016), and research indicates that the academic department is an important locus of influence and change (Authors, 2016), we chose to explore that influence through the lens of organizational climate.

Organizational climate consists of perceptions of current organizational elements (e.g., patterns of relationships, atmosphere, organizational structures) that have the potential to influence attitudes and behaviors (Peterson & Spencer, 1990; Schneider, 1975, Schneider & Reichers, 1983; Schneider et al., 2013). Since organizational climate can operate on different organizational levels (Kozlowski & Klein, 2000), it is most useful when focused on specific outcomes – "climate for something" (Schneider, 1975). In our case, we were interested in climate for *instructional improvement*, which we define as the action or process of making changes in instruction with the goal of achieving the best possible learning outcomes. This includes the introduction or continued use of evidence-based instructional strategies, technologies, and/or curricula.

We set out to purposefully design an instrument that elicits organizational climate for teaching improvement in academic departments. The resulting survey, the Survey of Climate for Instructional improvement (SCII), is reliable, interdisciplinary, and elicits a range of climate factors related to teaching improvement.

Methods

Instrument Development

Since an instrument to capture climate for teaching improvement did not already exist, we examined the literature for theoretical and conceptual frameworks from which to develop one. We chose the framework of faculty work elements by Gappa, Austin, and Trice (2007) because its key elements include aspects of the faculty work experience (academic freedom and autonomy, collegiality, professional growth) and characteristics of academic departments (resources, rewards, leadership).It is also compatible with the related literature in workplace ‘climate for change’ (Bouckenooghe, Devos, & Van den Broeck, 2009), the nature of academic work and workplaces (Massy, Wilger, & Colbeck, 1994), departmental teaching climate (Beach, 2002; Knorek, 2012), and leadership for teaching (Ramsden, Prosser, Trigwell, & Martin, 2007). We used all of this literature to develop seven potential components of departmental climate for instructional improvement: resources, rewards, professional development, leadership, collegiality, academic freedom and autonomy, and attitudes about students and teaching. We operationalize each of these apriori components in our chapter in *Transforming institutions: Undergraduate STEM in the 21st Century* (Authors, 2015).

We modified itemsfrom existing surveys when possible (Bouckenooghe et al., 2009; Hurtado, Eagan, Pryor, Whang, & Tran, 2011; Knorek, 2012; Ramsden et al., 2007) and self-generated items when necessary. As we wrote and revised items, we sought to refer to *group* rather than *individual* perceptions, so that organization-level perceptions were properly represented (Glick, 1985).

We purposefully chose a 6-point Likert style scale for the SCII with the following response options: strongly agree, agree, somewhat agree, somewhat disagree, disagree, and strongly disagree. Six point agree-disagree scales are considered preferable to 4-point scales, as they generate better variance (Bass, Cascio, & O’Connor, 1974). We chose to have no neutral point on the scale, as forcing agreement or disagreement avoids an increase in participants claiming ‘no opinion’ when they actually have one (Bishop, 1987; Johns, 2005).

Data Sources

The instrument in its entirety was field tested with a sample of faculty members from non-participating institutions (N=5) and an expert panel of education researchers at another institution (N=4) prior to piloting the survey. This process allowed for items to be evaluated for clarity, revised, new items to be added, and for the structure and definition of each climate construct to be refined. We then surveyed 713 postsecondary STEM and applied science instructors at four institutions in the United States (Table 1). Demographics of the surveyed institutions are in Table 1. The survey was administered online using Qualtrics and the overall response rate was 26.6% (713/2681).

Analysis

We ran factor analyses to examine which items consistently loaded together, following Hu and Bentler's (1995) recommendations for evaluating model fit. We first ran exploratory factor analyses (EFA) to identify dimensions of climate using maximum-likelihood extraction with both Promax rotations. We selected a maximum-likelihood extraction as it allows for the shared variance from the model each time a factor is created, while allowing the unique variance and error variance to remain in the model. We selected a Promax rotation method as we expected some of the factors to be oblique (correlated), and because oblique rotations often yield identical or superior results to orthogonal rotations (Osborne, 2015). Competing models (e.g., a four-dimensional vs. five-dimensional model) were compared using the likelihood ratio test under the null hypothesis that a more complex model would not significantly improve fit with the data at $p < 0.05$.

We then completed confirmatory factor analyses (CFA) to evaluate our EFA categorization of the items. We evaluated goodness of fit of hypothesized models by using the root mean square error of approximation (RMSEA; Steiger, 2000), Chi-squared/df below 5.0 (Bollen, 1989), and a comparative fit index (CFI) near 0.90 (Hu & Bentler, 1999; Byrne, 2013). Guidelines for acceptable model fit statistics values vary. Hu and Bentler (1995) suggest an RMSEA of 0.06 as indicative of a good-fitting model. MacCallum, Browne and Sugawara (1996) suggest values of 0.01, 0.05, and 0.08 as indicative of excellent, good, and mediocre fit, respectively.

We also ran ANOVA, independent t-tests, and correlational analyses to examine differences in groups of interest to see if SCII could identify group differences in organizational climate and if those differences were similar to other claims in the literature.

Results

Exploration of the Climate Factors

Exploratory factor analyses revealed five factors of climate for instructional improvement across the four institutions. Items in these factors were related to leadership (7 items; $\alpha = 0.946$), collegiality (5 items; $\alpha = 0.889$), resources (7 items; $\alpha = 0.861$), respect for teaching (7 items; $\alpha = 0.907$), and organizational support (4 items; $\alpha = 0.645$). Reliabilities for each factor could not be improved with removal of items.

Confirmatory factor analyses based on the five factors that emerged from the EFAs also support a good to very good fit of the 5-factor solution for the SCII (Chi-squared/df = 3.704; CFI = 0.889; RMSEA = 0.077). We present details on the factors in Table 2.

Institutional and Departmental Differences

We found mean climate factor scores significantly differed among institutions for all of the five climate factors (p < 1E-8). Notably, post-hoc Scheffe tests indicated interesting homogenous subsets of data, which we will discuss in more detail in the full paper. We found that these subsets place Institutions A and C as not significantly different from each other but with significantly lower leadership, collegiality, resource, and respect scores than Institutions B and D (which likewise did not significantly differ from one another). In contrast, despite low means across the other factors, mean organizational support at Institution A was significantly higher than Institutions B, C, and D.

Mean climate factor scores on the SCII also significantly differed by department at each institution. This pattern of department differences was consistent for most factors at the four different institutions and remained significant during post-hoc tests (see Figure 1 for an example set of these patterns at Institution C).

Gender, Ethnic Group, and Academic Rank Differences

None of the climate factor means significantly differed by academic rank (tenured, tenure track, or non-tenure track) or by ethnic group (Asian, Black, Hispanic or Latino/a, Native American, White, Multi-racial). Likewise, mean climate factor scores did not significantly differ by gender for Leadership, Collegiality, and Respect for Teaching ($p > .05$). However, mean climate scores significantly differed between women and men for Resources ($p = .008$) and Organizational Support ($p = .002$). Women (55.9 ± 29.2; 50 = neutral) perceived resources for teaching more positively than men (49.8 ± 29.2). In contrast, men (55.0 ± 18.6) perceived organizational support for teaching (e.g. structured groups) more positively than women (50.1 ± 17.6). We plan to unpack these differences through analysis of covariance in our final paper.

Years Teaching

Our data support a significant, positive correlation between number of years teaching and Collegiality (r=. 122; $p < .05$). The collegiality factor includes items that describe frequency of discussions with others and exchange of teaching related resources with others. This finding is in step with the social network analyses of Van Waes, Van den Bossche, Moolenaar, De Maeyer, & Van Petegem (2015), who noted that experienced faculty with teaching expertise had larger, stronger, and more diverse networks of colleagues than less experienced faculty. Inexperienced faculty also had large networks, but had weaker ties and less diversity within their networks, providing evidence for the role of collegial interactions throughout the teaching career of faculty.

Significance

Our research documents support for an instrument that can differentiate among elements of climate for teaching improvement. The instrument is reliable, easy-to-use, and can quickly collect data from a large number of participants. Understanding and measuring differences in climate for teaching improvement enables faculty developers, higher education researchers, and discipline-based education researchers to identify key levers for improving teaching, thereby better planning future change initiatives.

Our study provides empirical support for the model of ‘essential elements that impact faculty work life proposed in Gappa et al. (2007). Leadership accounted for over 40% of the variance in the SCII, indicating that formal department leader(s) and their policy decisions have a central role in climate. Similarly, other higher education researchers have also noted leaders’ influence in creating a sense of belonging and job satisfaction of faculty (Campbell & O’Meara, 2014), and the importance of a supportive department environment for interchange of resources (Van Waes et al., 2015).

Items from some of our apriori climate categories merged into the same factor, providing insight into the nature of organizational climate for teaching improvement. For example, within the Resources factor, items we considered to elicit perceptions of academic freedom and autonomy (Gappa et al., 2007) loaded together with items addressing time, financial, and space resources (Beach, 2002; Knorek, 2012). Items eliciting other aspects of climate, including (a) faculty rewards and (b) shared views of teaching and learning, did not consistently load onto clear climate dimensions.

Our study provides insight into the common claims regarding barriers to instructional innovation. Although the goal of this paper is to present our climate instrument, we expect to continue unpacking relationships between climate and teaching practice (as measured by the Postsecondary Instructional Practices Survey; Authors, 2016). In contrast, we found significant differences in mean Resource scores among the four institutions ($p < .05$), yet the Resources factor was not significantly correlated to use of student-centered instructional practices. This provides support for the argument that evidence-based teaching requires more than removing barriers (or perceived barriers) to resources (e.g., Fairweather, 2005). These emerging relationships will be further discussed in the full paper.

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Table 1. Demographic and sample size information for the surveyed institutions.

	Institution A	Institution B	Institution C	Institution D
N	216	164	132	201
Departments Surveyed	19	9	5	24
Disciplines	STEM and Applied sciences	STEM	STEM	All disciplines
Instructors Surveyed	Full-time faculty Part-time faculty Graduate students	Full- and Part-time faculty	Full-time faculty Full-time staff Graduate Students	Full-time faculty Part-time faculty Graduate students
U.S. Region	Great Lakes	Mid-Atlantic	Midwest	Midwest
Control	Public	Private	Public	Public
Carnegie Classification	High research activity	Very high research activity	Very high research activity	High research activity
Student Population	25K	28K	35K	9K

Table 2. Eigenvalues from the exploratory factor analysis, including percent contribution to overall variance, construct reliability, number of items, and representative items for each of the SCII climate factors.

Factor	Eigenvalue (% Variance)	Construct reliability	Number of items	Representative Items
Leadership	13.809 (41.846%)	0.946	7	The department chair has a clear vision of how to improve teaching in the department.
Collegiality	2.788 (8.449%)	0.886	5	Instructors in my department discuss the challenges they face in the classroom with colleagues.
Resources	1.854 (5.618%)	0.861	7	Instructors in my department have adequate time to reflect upon and make changes to their instruction.
Respect for Teaching	1.696 (5.139%)	0.907	7	In my department, evidence of effective teaching is valued when making decisions about continued employment and/or promotion.
Organizational Support	1.153 (3.493%)	0.645	4	In my department, there are structured groups organized around the support and pursuit of teaching improvement.

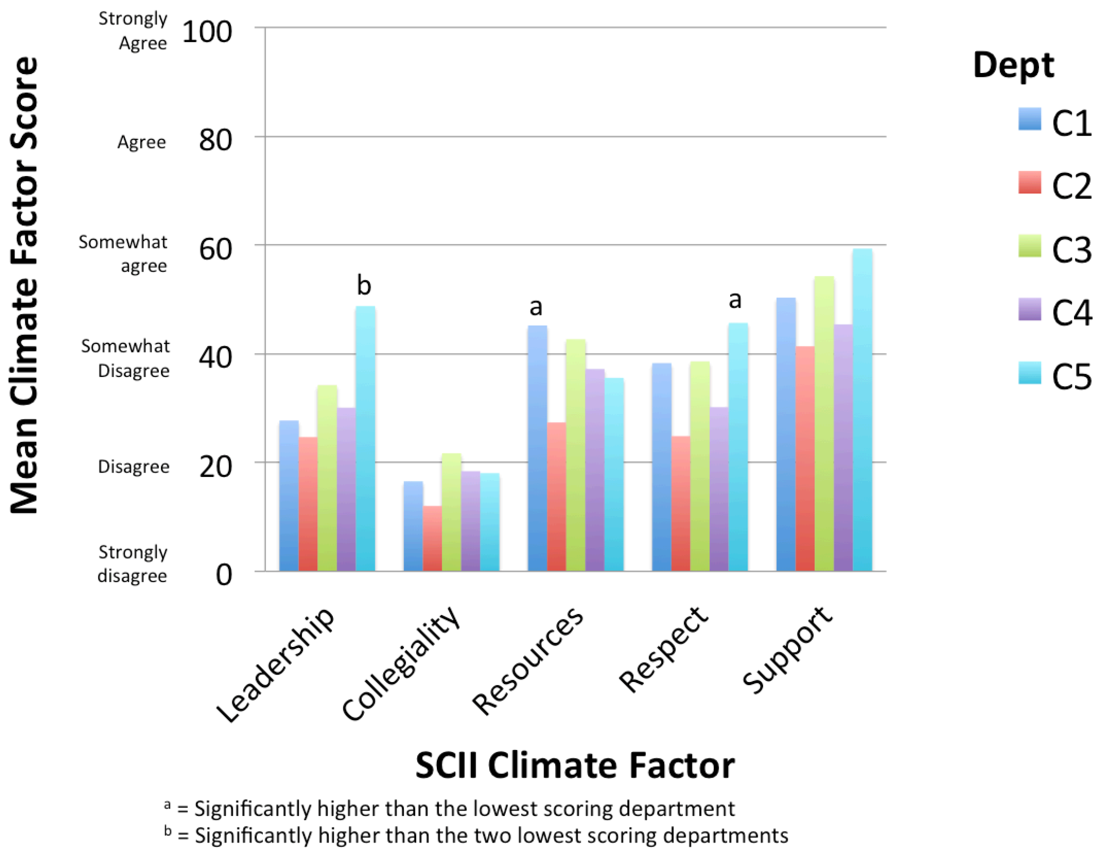

Figure 1. Mean Climate Factor Scores for the 5 STEM departments at Institution C, with significant differences ($p<.05$) noted. A mean score of 50 is equivalent to neutral on the SCII Likert-style scale (0-100).