

# Pedagogical Signals of Faculty Approachability: Factors Shaping Faculty–Student Interaction Outside the Classroom

Bradley E. Cox · Kadian L. McIntosh · Patrick T. Terenzini · Robert D. Reason · Brenda R. Lutovsky Quaye

Received: 22 June 2009 / Published online: 3 August 2010  
© Springer Science+Business Media, LLC 2010

**Abstract** Decades of research demonstrate that college students benefit from positive interaction with faculty members, although that same evidence suggests that those interactions are far from common, particularly outside the classroom. Moreover, relatively little is known about which, when, how, and why faculty members choose to engage with students outside of the classroom. Guided by the theory that faculty members use in-class behaviors to signal their “psychosocial approachability” for out-of-class interaction with students (Wilson et al. in *Sociology of Education* 47(1):74–92, 1974; College professors and their impact on students, 1975), this study uses data from 2,845 faculty members on 45 campuses to identify the personal, institutional, and pedagogical factors that influence the frequency and type of interaction faculty members have with students outside of the classroom.

**Keywords** College teaching · Student–faculty contact (interaction) · Psychosocial approachability · Faculty gender · Contingent faculty · Pedagogical signals

The educational value of faculty–student interaction outside the classroom is among the oldest and most widespread beliefs in American higher education. Indeed, in 1871 then-to-be President James A. Garfield asserted that “The ideal college is Mark Hopkins on one

---

A previous version of this paper was presented at the 2009 Annual Meeting of the American Educational Research Association. Special thanks to Charles F. Blaich and the Wabash National Study of Liberal Arts Education.

---

B. E. Cox (✉)  
Department of Educational Leadership and Policy Studies, Florida State University,  
1209 Stone Building, Tallahassee, FL 32306, USA  
e-mail: brad.cox@fsu.edu

K. L. McIntosh · P. T. Terenzini · R. D. Reason  
Center for the Study of Higher Education, Pennsylvania State University,  
400 Rackley Building, University Park, PA 16802, USA

B. R. Lutovsky Quaye  
Office of Student Conduct, University of Maryland, College Park, MD, USA

end of a log and a student on the other” (Rudolf 1962). The image is useful for its suggestion that much of the educational impact of faculty–student interaction can occur beyond the classroom walls. Despite decades of research confirming the importance of such interactions, there remain considerable theoretical and practical limitations that interfere with institutional efforts to increase the quantity and quality of faculty interaction with students outside of class.

This study sought to rectify, at least in part, the practical and conceptual oversights of current models of faculty–student contact by examining the personal and professional characteristics, orientations, and behaviors that dispose some faculty members and not others to interact with students outside the classroom. In brief, the study seeks to answer questions about why some faculty engage with students outside of class, whether current theories warrant fuller specification, and how institutions might increase the frequency of faculty–student interaction. More specifically, this study tests the hypothesis that the frequency and type of *out-of-class* interactions are a result of faculty members’ *in-class* behaviors that signal for students the instructors’ “psychosocial approachability” (Wilson et al. 1974, 1975).

## Literature Review

No shortage exists of empirical studies of the nature, quality, and frequency of faculty–student contact and their educational consequences for students. Jacob (1957), in one of the earliest studies of the college influences shaping students’ sociopolitical attitudes, found that institutions that appeared to have a “peculiar potency” were those in which faculty–student interactions were “normal and frequent and students find teachers receptive to unhurried and relaxed conversations out of the class” (p. 8). Literally hundreds of subsequent studies have probed the educational outcomes of faculty–student interactions.

### Why Non-Classroom Faculty–Student Interaction Matters

The effects of those contacts manifest themselves in a wide array of academic, cognitive, psychosocial, and attitudinal areas. Positive student outcomes linked with faculty–student interaction include grade-point average (Anaya and Cole 2001), persistence (Pascarella and Terenzini 1977), self-reports of learning (Lundberg and Schreiner 2004), plans for graduate study (Hathaway et al. 2002), social integration/adjustment (Schwitzer et al. 1999), and a variety of other educationally valuable activities (Kuh and Hu 2001). Pascarella (1980) provides an excellent, if now somewhat dated, review of the literature on the effects of student and faculty interactions outside the classroom. Some of the more recent studies (e.g., Anaya and Cole 2001; Cole 2007; Gellin 2003; Lundberg and Schreiner 2004), have not only confirmed the findings of early studies, but also the conditional effects of such interaction based on sex (Sax et al. 2005; Wawrzynski and Sedlacek 2003) and race/ethnicity (Anaya and Cole 2001; Kim and Sax 2007; Nettles et al. 1986).

The outcomes associated with faculty–student contact also appear to vary depending on the *type* of interaction that takes place. Interactions with a substantive focus appear to have a greater impact on knowledge acquisition and skill development, for example, than do more casual, less-focused contacts (see, for example, Kuh and Hu 2001). Studies of students’ development of higher-order cognitive skills also suggest that the purpose and quality of faculty–student interactions may be more important than their frequency. The effects of such contact appear to be greatest when the interactions augment and reinforce

the academic ethos of the campus or that focus on student development issues (e.g., Astin 1993; Ishiyama 2002). For this reason, Pascarella and Terenzini (2005) concluded that the frequency of faculty–student contact may be less important than its topic.

### Infrequent Interaction, Limited Awareness of Why

Regardless of the topic of discussion, previous research suggests that student–faculty contact outside the classroom is a relatively rare occurrence. Despite the consistent findings that students’ interactions with faculty members outside the classroom contribute to a number of positive educational outcomes, Pascarella’s (1980) review produced ample evidence that relatively few students report such interactions, and most of the contacts are infrequent. Moreover, this phenomenon appeared common at the majority of academic institutions. Recent evidence indicates that little has changed in the past 50 years and that such interactions remain relatively infrequent (Chang 2005; Cotten and Wilson 2006; Cox and Orehovec 2007).

Virtually all of the studies published over a 35-year period that Pascarella and Terenzini (1991, 2005) reviewed, however, treat faculty–student contacts as independent, rather than dependent, variables. Few studies have examined *why* some faculty members report more frequent non-classroom interactions with students than do their counterparts.

Vianden (2006) is among a handful of scholars to go beyond assessing differences associated with students’ socio-demographic traits to address the “why” question. Vianden found that many students do not know how—or even why—to interact with faculty members outside the classroom. Data from the National Survey of Student Engagement (2008) suggest that, during their years at college, students may develop an understanding of the purpose and process of contacting faculty members outside of class. First-year students, as well as those who are generally unfamiliar with college norms (e.g., first-generation students) or with lower levels of self-confidence or self-efficacy may be especially uncomfortable talking with faculty members.

### Why Some Faculty Members Interact More Than Others

Similarly, very few studies have examined why some faculty members are more likely to interact with students than are some of their colleagues. This limited body of evidence suggests that faculty members who have a student-centered philosophy of education and believe that teaching is a critical part of their role as professors consistently display higher levels of out-of-class interaction with students (Cotten and Wilson 2006; Einarson and Clarkberg 2004; Golde and Pribbenow 2000). So, too, do faculty members with friendly personalities and strong interpersonal skills (Einarson and Clarkberg 2004; Wilson et al. 1974).

These characteristics may shape teaching behaviors and styles that signal to students the professors’ interest in and availability to students outside of class. For example, faculty members’ signals of their “psychosocial accessibility” to students (Wilson et al. 1974, 1975) can take multiple forms, some obvious (e.g., occasionally, but repeatedly, inviting students to ask questions during or after class), others more subtle (e.g., facial expressions, keeping office hours, responding to questions in ways that reflect a genuine interest in helping students learn). These behaviors, in turn, may encourage students to seek such out-of-class contact with instructors (Cotten and Wilson 2006; Snow 1973).

Faculty members’ field/discipline and levels of commitment to the several dimensions of a faculty member’s responsibilities (i.e., teaching, research, and service) may also play a role (for a review, see Einarson and Clarkberg 2004). Finally, some research suggests that

faculty members' employment status (e.g., full-time/part-time, tenure status) has an effect on their level of interaction, with untenured or contingent faculty members less likely than their tenured or tenure-line colleagues to engage with students outside of class (Golde and Pribbenow 2000; Umbach 2007).

The single-minded concentration over the past 35 years on the nature and outcomes of students' out-of-class interactions with faculty members, together with the comparative handful of studies on *why* some faculty members and some students interact with members of the other group more frequently than do their peers is something of a curiosity. From a practical perspective, colleges and universities have, as a result, adopted essentially a *Field of Dreams* mentality: "If we build it, they will come." Many institutions have developed and invested resources in programs designed to enhance student learning and increase faculty–student interaction (e.g., "take a professor to lunch," in-residence faculty members, undergraduate research programs). These investments, however, have been made largely in the absence of evidence that any or many faculty members will respond and make a serious effort to participate in such programs. With an analysis of the interconnected nature of factors related to faculty–student interaction, this study provides institutions some insight regarding which—and why—certain faculty members engage students outside of the classroom.

### Conceptual Framework

The extant literature on faculty–student interaction suggests that a variety of factors—both institutional and individual—may influence the frequency with which a faculty member engages students outside of the classroom. Although such an inference is drawn largely from a synthesis of findings from independent quantitative studies, three recent studies (Cotten and Wilson 2006; Einarson and Clarkberg 2004; Golde and Pribbenow 2000) have used qualitative methods to arrive at similar conclusions. This study examines the relative influence of these two sets of factors on faculty members' dispositions to interact with their students outside the classroom. The conceptual framework (see Fig. 1) for this study hypothesizes that out-of-class interaction is the direct result of professors' in-class pedagogical behaviors and other professional statuses/activities. These practices are themselves shaped by both instructors' personal characteristics and institutional environments.

The relationship between casual and substantive interaction is a source of uncertainty, both conceptually and practically. Previous studies have employed a highly diverse and inconsistent set of measures when examining faculty–student interaction. While many studies focused on in-class interactions (e.g., Pascarella et al. 1978) or academic/



**Fig. 1** Conceptual model of out-of-class faculty–student interaction

intellectual interactions (Kim and Sax 2007; Nagda et al. 1998), others have considered a wider variety of interactions (Anaya and Cole 2001; Lundberg and Schreiner 2004; Sax et al. 2005), thus obfuscating the distinctions between interaction types. A recent qualitative study (Cox and Orehovec 2007), in which different types of interaction were identified via inductive analysis of data from both faculty members and students, suggests that incidental contact between professors and students can serve as a springboard to more purposeful subsequent interactions. Such purposeful interactions could be either personal or functional in nature, and could occasionally lead to long-term mentoring relationships. The survey questions for the current study were designed to reflect three of the types identified by Cox and Orehovec (2007): incidental contact, functional interaction, and personal interaction. However, confirmatory factor analysis failed to support the three-type model. Instead, the data suggested a two-factor solution was more appropriate—one somewhat different from what we had anticipated. Although this two-factor solution (i.e., casual interaction and substantive interaction) does not specifically reflect any a-priori theory or model, it has empirical support and reflects constructs that are both imbued with common-sense connotations and conceptually distinct. Nonetheless, because the factor analysis indicated a strong relationship between casual and substantive interaction, our structural models allow their associated error terms to covary.

## Methods

### Data Collection

Data were collected as part of two larger research projects: Parsing the First Year of College and the Wabash National Study of Liberal Arts Education. Surveys were sent to the entire faculty (or, for large institutions, to a random sample of 500) at 45 four-year colleges and universities in the United States. A response rate of 44.2% yielded 5,667 faculty respondents. The data for the analysis in this paper come from the 2,845 of these faculty members who had recently taught any course that serve primarily first-year students and who had values for all of the variables relevant to the current analysis (see Table 2).

### *Sampling of Institutions*

Invitations to participate in the Parsing the First Year of College study were distributed via email, website, listservs, and at multiple conferences related to higher education. Fifty-one institutions applied to participate in the project, from which an initial group of 34 was selected to participate (though two later dropped out of the study). This original group matched the national distribution of four-year, regionally accredited not-for-profit American institutions in terms of Carnegie classification and size. Then, to ensure that our sample of institutions would yield a sufficient number of participants we added two additional large institutions (more than 1,000 entering students in 2004). A subsequent partnership with the Wabash National Study of Liberal Arts Education added eleven more institutions to our sample for the faculty survey, yielding a total of 45 participating institutions (see Appendix A for a complete list of participating institutions). Thus, the final sample is sizable in number and diverse in composition, inclusive of a wide range of institutional types, sizes, levels of selectivity, and sources of control/funding. Nonetheless, because the sample is not necessarily representative of the nation's colleges and universities, we urge caution when considering generalizations to other institutions.

### *Sampling of Faculty*

Faculty members at participating institutions were defined as all tenured, tenure-track, and non-tenure track instructional staff of all ranks (i.e., professor, associate professor, assistant professor, instructor, or lecturer), regardless of their full- or part-time status. Because the larger project focuses on first-year student outcomes, the definition excluded faculty members in programs that serve only graduate students, teach only evening or continuing education division courses, or hold adjunct, clinical, or emeritus titles. In most cases, the entire faculty population (as defined) on a campus was invited to participate. At institutions where the size of the faculty prohibited a census, a simple random sample of 500 faculty members was drawn.

### *Survey Instrument*

Surveys of faculty perceptions and practices were developed by a team of researchers working on the project. Questionnaires gathered information on respondents' personal characteristics, pedagogical practices, professional activities, and perceptions of their campus's approach to the first year of college. The larger study's conceptual framework (Terenzini and Reason 2005) and existing empirical research guided development of survey items and scales, and the instrument used in the present study is a revised version of a survey used in a previous study on the first year of college (Reason et al. 2006, 2007). Faculty members were able to complete either electronic or paper versions of the survey. Survey items related to the constructs considered in this analysis are presented in Table 1.

### *Variables*

Scales were developed using a series of principal components analyses (with varimax rotations) of related sets of items. Only components loading .40 or higher were retained; items loading above .40 on two or more factors were excluded. Scale scores for use within hierarchical linear models were developed by averaging a respondent's responses on the component items; for the structural equation models, each scale was treated as a latent construct with several observed indicator variables (see "[Measurement Model](#)" section and Tables 1 and 3 for more details).

The dependent variables in this study are two factorially derived measures of faculty members' frequency of interaction with students outside of class. The "casual interaction" scale measures the frequency with which faculty members "exchange brief greetings," "have casual conversations," or "discuss non-academic topics of mutual interest" with students (Cronbach's  $\alpha = 0.905$ ). The "substantive interaction" scale reflects how often faculty members "discuss matters related to a student's future career," "discuss a student's personal (non-academic) matters," or "discuss intellectual or academic-related matters" (Cronbach's  $\alpha = 0.789$ ).

### *Faculty-Member-Specific Variables*

The survey instrument included measures of faculty members' demographics, field, teaching style, and employment status. Teaching style is measured by four scales derived from a 14-item question asking about the frequency with which faculty members engage in specific teaching practices. Employment status is indicated by faculty members' academic rank and years of experience. Faculty members were not asked about their personal beliefs

**Table 1** Specification of the variables in analytical models

## Faculty–student interaction (criterion) variables

*Casual Interaction:* A three item scale drawn from a series of items in which faculty members wrote-in a number specifying, “in a typical academic term, how many *times per week* do you interact with first-year students *outside of class* and:” “discussed non-academic topics of mutual interest,” “had casual conversations,” or “exchanged brief greetings.” (alpha = .905)

*Substantive Interaction:* A three item scale drawn from a series of items in which faculty members wrote-in a number specifying, “in a typical academic term, how many *times per week* do you interact with first-year students *outside of class* and:” “discussed matters related to the student’s future career,” “discussed a student’s personal matters,” or “discussed intellectual or academic-related matters.” (alpha = .789)

## Exogenous (control) variables

Sex: 0 = male, 1 = female

Race: 0 = non-white, 1 = white

Job Status: 0 = full time, 1 = part time

Field: dummy coded humanities, social sciences, professional/other fields; reference category is natural/physical sciences

Desire to teach: 0 = teach first-year courses because “required” to do so; 1 = teach first-year courses because they “choose” to

## Teaching practice (pedagogy) variables

*Active Teaching and Assessment:* A six-item scale, where 1 = “not at all” and 4 = “a great deal,” indicating the extent faculty members, in courses that serve primarily first-year students (excluding first-year seminars), use the following: “lecture” (reverse coded), “in class discussion,” “multiple drafts of written work,” “papers and other open-ended assignments,” “student presentations,” and “multiple-choice tests/exams” (reverse coded). (alpha = .751)

*Learning through Application:* A five-item scale, where 1 = “not at all” and 4 = “a great deal,” indicating the extent faculty members, in courses that serve primarily first-year students (excluding first-year seminars), use the following: “collaborative/cooperative learning,” “experiential/problem-based learning,” “group projects,” “hands-on experiences,” and “assignments or exercises focusing on application.” (alpha = .815)

*Promoting Encounters with Difference:* A four-items scale, where 1 = “never” and 4 = “very often,” indicating how often the faculty members “provide opportunities for your first-year students in your classes to learn about people who differ from them in ‘background characteristics (e.g., gender, race)’” or “attitudes or values (e.g., politics, religion),” how often they “give your first-year students assignments that require them to examine ideas/perspectives other than their own”, and how often they “ask first-year students in your classes to wrestle with ideas or points of view that differ from their own” (alpha = .902)

*Feedback to Students:* A two-item scale, where 1 = “not at all” and 4 = “a great deal,” indicating the extent faculty members, in courses that serve primarily first-year students (excluding first-year seminars), use the following: “frequent feedback to students on their progress,” and “detailed feedback to students on their progress.” (alpha = .796)

## Professional status &amp; activities (occupational practices) variables

Faculty Rank: 0 = non-tenure-track, 1 = assistant, 2 = associate, 3 = full professor

Number of First-Year Courses: number of courses taught, excluding first-year seminars, that serve primarily first-year students

Hours per week—Research: in a typical academic term, the approximate hours per week dedicated to research/scholarship

Hours per week—Total: in a typical academic term, the approximate total hours per week dedicated to the institution

*Note* Items in italics indicate composite, multi-item scales

about teaching or their interpersonal abilities. However, the survey included items that asked faculty the extent to which their institution encouraged professors to teach and interact with first-year students.

### *Institutional Variables*

Responding to the implications of previous single-institution studies, this study initially included a number of institution-level variables that were hypothesized to affect faculty–student interaction. Basic institutional data, including Carnegie classification, size, and control, were collected from IPEDS. Institutional culture was measured by two scales indicating the extent to which the faculty felt the institution emphasized first-year student success or the teaching function of the institution. A survey completed by each participating campus’s Chief Academic Officer gathered additional data about related policies. However, because our results indicated very little institutional variability in faculty–student interaction, these institutional variables were not employed in the final analysis.

### Data Preparation

Like most studies involving surveys, our dataset included some missing data. To maintain adequate sample sizes while eliminating cases with incomplete responses, we cut those cases with 20% or more of their data missing. With the remaining cases, we imputed missing data using the EM algorithm. To address possible response bias, we developed weights so that individual cases would be representative of their campus in terms of race, sex, rank, and field; we also developed weights at the institution level to adjust for varying response rates across institutions.

Finally, prior to conducting the analysis presented here, variables to be included in the models were checked for outliers. Two extreme cases were identified as having infeasible values on indicator variables for the latent outcomes (i.e., casual and substantive interaction). Values deemed unreasonable (e.g., 1,000 interactions per week) were recoded and set equal to the next highest value found for that variable in any other case. This procedure was adopted because it allowed us to largely stay true to the respondents’ data without allowing two cases to exert undue influence on models fit to the 2,843 other cases.

### Analytical Procedures

Analysis proceeded in two major phases. The first phase involved the fitting of a hierarchical linear model to predict separately the frequency of casual and substantive interaction by faculty members. The second phase involved the fitting of a series of structural equation models to both outcomes simultaneously.

### *Hierarchical Linear Modeling (HLM)*

In an effort to examine the extent to which levels of faculty–student interaction varied across institutions, an initial hierarchical linear model was fit for each interaction scale with no predictor variables at either the individual or institutional levels. This unconditional model, essentially an ANOVA, was used to partition the variance in the outcome variables between the individual and institutional levels of analysis (Porter 2005; Raudenbush and Bryk 2002). Model building would have proceeded by adding significant

level 1 (individual) and level 2 (institutional) variables sequentially until a complete and parsimonious model was attained. However, as outlined in the results section below, the results of the unconditional models indicated very little between-institutional variance. Therefore, the HLM analyses were abandoned to instead develop a series of structural equation models with individuals as the unit of analysis.

### *Structural Equation Modeling (SEM)*

One goal of this research was to examine the extent to which instructor's in-class behavior served as a signal to students regarding that instructor's willingness to engage with students outside of class. Because some recent literature and our initial descriptive analyses suggested that levels of interaction may be related to faculty members' individual background and characteristics (e.g., race, gender, field), our research question could be restated as: How do instructors' in-class pedagogical practices mediate the effects of personal characteristics on the frequency with which instructors interact with students outside of class?

Structural equation modeling is a uniquely powerful tool for the analysis of mediating variables, especially when key constructs are not directly observed (Kline 2005). The development of our structural equation models proceeded through several stages. First we fit a measurement model (Model 1) defining each of the six latent variables (two types of interaction and four pedagogical practices). Next we fit a series of structural models. Because of the uncertain causal directionality between casual and substantive interaction, all structural models allowed the error terms associated with these two latent variables to covary. In addition, reflecting the practical similarities between pedagogical constructs, we allowed the error terms of the four latent pedagogical variables to correlate. Finally, we allowed error terms of indicator variables to covary within a given latent variable, but not across variables. The resulting factor structure has the effect such that the path coefficient from a specific pedagogical practice to an outcome variable represents the *unique* variance in the outcome attributable to the specific practice. Any shared effect of the pedagogical practices will be accounted for by the covariances between latent variable error terms.

After the measurement model we fit a reduced-form model (Model 2) that included just the exogenous predictors and the two outcome variables. Model 2 served as a baseline for subsequent models. The unstandardized coefficients for this reduced-form model represent the total effects of an individual's personal characteristics on their frequency of out-of-class interaction with students. Subsequent models attempt to explain away these coefficients by including potentially mediating variables.

We next fit a recursive model (Model 3) that included all of the hypothesized mediating variables (i.e., pedagogical practices and job status/activities) outlined in the conceptual framework, intending to employ an empirical model-*trimming* process (Kline 2005). However, as detailed in the results section below, we were surprised by a few of the coefficients estimated by Model 3. In an effort to explain some of these unexpected results, we revisited the modeling procedures and decided to instead employ a model-*building* process; starting from a reduced form model (Model 2) we added the major conceptual components in blocks, creating a series of progressively more comprehensive models.

First, we added to the baseline model a string of variables related to professors' professional status, activities, and time commitments (Model 4). In effect, we use this model to determine how much the various effects of background characteristics on the frequency of interaction were the result of differences in job functions and time commitments.

Next, we removed the occupational practices variables and instead added the pedagogical variables to the reduced form model (Model 5). These variables are modeled as

interrelated components of one's in-class pedagogical practices. We use this model to determine how much the various effects of background characteristics were the result of differences in teacher behavior inside the classroom.

Upon the observation of a perplexing result related to gender, we employed multi-group analysis to fit like-specified models simultaneously to gender-homogenous groups. We then reran the pedagogies-only model (Model 5) with the split sample, thus creating Model 6. Finally, we re-ran the complete recursive model (Model 3) with the split sample, thus creating Model 7.

## Limitations

The current study has limitations that generally fall into three categories. First, the measurement of the constructs under study was constrained by the narrow focus of the larger projects and the data available for the current analysis. The data used in this study come from faculty members only; we are unable to corroborate faculty reports with consequent student experiences. Moreover, the faculty members reported their levels of interaction with first-year students only. While the first year of college has been identified as especially critical to longer-term student outcomes (Pascarella and Terenzini 2005), the research evidence also suggests that students may be more likely to engage with faculty members as they advance through their college years (Kuh and Hu 2001; National Survey of Student Engagement 2008). In addition, the measurement of faculty–student interaction is based on reports of frequency, not on length of time spent interacting or on the perceived quality of such interactions.

Second, there are several potentially influential variables that were not explored in this study. In particular, we suspect that faculty beliefs about teaching and advising, or about their role in the system of higher education, may affect the frequency with which they interact with students outside of class. These faculty-member beliefs may actually manifest in classroom behaviors too subtle to register in our pedagogical scales. Moreover, as outlined in the results section, our final analyses focused on individuals, not institutions. Future scholarship may find it valuable to extend our analyses by investigating the manner in which institutional policies and practices affect levels of out-of-class interaction between faculty members and students.

Finally, there remain two causal ambiguities that our study was unable to address. The first ambiguity relates to outcomes associated with faculty–student contact: do students gain critical thinking skills, persist more, or graduate more readily *because* they interact with the faculty, or do those students who are already on-track to success *seek out* interactions with faculty members? Because our study is focused on the mechanisms that facilitate interaction, we do not attempt to address this issue. Instead, based on the bulk of literature reviewed above, we adopt the belief that student–faculty interaction can be a positive influence on student outcomes. A second ambiguity surrounds the relationship between types of interaction (i.e., substantive and casual interactions). Some have argued that seemingly trivial or perfunctory interactions facilitate more meaningful subsequent interactions (Cox and Orehovec 2007). But an argument could also be made that the causal ordering is actually the reverse: it is through successful substantive interactions that students build a strong rapport with faculty members that facilitates more casual subsequent interactions. In all likelihood, these logical but conflicting arguments are indicative of a reality in which relationships between students and faculty members develop in complex,

reciprocal, and context-specific ways. Accordingly, our analyses model a reciprocal, not a causal, relationship between types of interaction.

## Results

Presentation of the results follows the organization implied by our analytical methods. After examining basic descriptive statistics we explore institutional influences on faculty–student interaction through hierarchical linear modeling. The remainder of the section reports results from a series of structural equation models that test several hypotheses related to factors mediating the relationship between faculty characteristics and their levels of interaction with students outside of the classroom.

### Descriptive Statistics

Drawing primarily on data provided by students, previous studies (Chang 2005; Cotten and Wilson 2006; Pascarella 1980) on non-classroom faculty–student contact have noted that these interactions are quite infrequent. Our study examines *faculty* reports of such interactions and, as shown in Table 2, confirms that relatively few faculty members have regular or frequent contact with students outside of class. While most faculty report ten or more weekly encounters with students in which brief greetings are exchanged, considerably fewer report an equal frequency of other types of casual interaction. Substantive out-of-class interaction appears particularly uncommon. For each of the three items that constitute the substantive interaction scale, the modal faculty member reported just one such interaction per week. Nonetheless, the comparatively higher means (relative to the median) for all six interaction questions suggests that some faculty members interact with students on a far more regular basis.

In Table 3, we compare the frequency of casual and substantive interaction between faculty members with various exogenous characteristics. The weighted results are representative of the populations sampled at the participating institutions; the unweighted results, while not formally representative, are nearly identical to the results from the weighted data. In fact, though the parameter estimates vary slightly due to weighting, the interpretation of statistical significance remains consistent in all 12 comparisons—regardless of the weight applied. These results give us additional confidence that

**Table 2** Faculty reports of weekly non-classroom interaction with first-year students

“in a typical academic term, how many times per week do you interact with first-year students outside of class and:”	25th %	50th% (Median)	75th %	Mode	Mean
<b>Casual</b>					
exchange brief greetings?	5	10	20	10	14.2
have casual conversations?	2	4	9	5	6.5
discuss non-academic topics of mutual interest?	1	2	5	1	3.9
<b>Substantive</b>					
discuss intellectual or academic-related matters?	1	3	5	1	4.4
discuss matters related to the student’s future career?	1	1	3	1	2.6
discuss a student’s personal matters?	1	1	3	1	2.4

*Notes* results reported in this table are weighted to be representative of the 45 participating institutions

**Table 3** Weekly frequency of casual and substantive interactions by sex, race, field, teaching interest, and job status

	n	Casual				Substantive			
		Unweighted		Weighted <sup>b</sup>		Unweighted		Weighted <sup>b</sup>	
		Mean	Signif. <sup>a</sup>	Mean	Signif. <sup>a</sup>	Mean	Signif. <sup>a</sup>	Mean	signif. <sup>a</sup>
Male	1638	8.40	0.014	8.18	0.002	3.04	0.153	2.98	0.242
Female	1211	7.75		7.60		3.01		3.01	
Non-white	327	5.60	0.000	5.70	0.000	2.80	0.946	2.74	0.476
White	2526	8.45		8.28		3.05		3.03	
Humanities	1141	8.88	0.004	8.31	0.017	3.11	0.091	2.99	0.484
Natural/physical science	778	7.58		7.40		3.05		3.02	
Social science	574	7.24		6.88		2.69		2.74	
Professional/other	357	8.31		8.66		3.25		3.15	
Required to teach	1098	7.12	0.003	7.04	0.026	2.80	0.242	2.75	0.351
Chose to teach	1755	8.74		8.50		3.17		3.14	
Full-time	2675	8.32	0.001	8.25	0.000	3.07	0.043	3.06	0.011
Part-time	178	5.04		4.93		2.38		2.35	
Non-tenure-track	460	8.27	0.675	8.09	0.858	3.66	0.001	3.53	0.000
Assistant	770	7.75		7.64		2.95		2.93	
Associate	753	8.33		8.00		2.96		2.80	
Full professor	870	8.18		8.01		2.82		2.70	

<sup>a</sup> Significance measured via t-test or one-way ANOVA

<sup>b</sup> Weighted to be representative of the total faculty population at the 45 schools, by race, gender, rank, and field. Also weighted for institutional response rates

unweighted structural equation models (the result of software limitations) yield results that can be meaningfully interpreted as relevant to all faculty members at our participating institutions.

It is also worth noting that, for all six exogenous characteristics considered, there exist statistically significant differences in the frequency of either casual or substantive interaction. On average, male instructors engage in casual interaction more frequently than do their female counterparts. So too, do White and full-time faculty members, as well as those who teach first-year courses by choice (not because they “have to”). Humanities faculty and those in professional/other fields appear to have more frequent casual interactions than those in the natural or social sciences. Fewer differences were seen in the comparisons of substantive interaction. Again, full-time faculty members engage in substantive out-of-class interaction with students more frequently than do part-time faculty. However, when compared to those in traditional tenure-line appointments, faculty members who are *not* on the tenure track report more frequent substantive out-of-class interaction. Finally, regardless of the population being considered, professors engage in casual interactions with students approximately twice as often as they engage in substantive interaction outside of class.

#### Institutional Effects: Hierarchical Linear Modeling

Because both the nature of the data and the conceptual framework suggest that individual attitudes and behaviors are nested within an institutional structure, analyses continued by

using hierarchical modeling to partition the variance in the outcome measures between the institutional and individual levels. This unconditional model (essentially an ANOVA) indicates that less than 3% of the variance in either outcome variable occurs between institutions.<sup>1</sup> Thus, even if we fit the perfect level 2 model, we would explain no more than 3% of the variability in the frequency of faculty-reported instances of contact with students outside the classroom. Instead, over 97% of the total variance occurs at the individual level, regardless of their institutional affiliation. With this finding in mind—dramatic within-college variance combined with little between-college variance—we chose to focus our analysis on the manner in which the behaviors of individual faculty-members shaped their level of interaction with students outside of class. Therefore, analysis continues using unweighted individual-level data to develop and test structural models explaining individual-level variations in faculty–student interaction.

### Pedagogical Signaling, Professional Practices, and Interaction: Structural Equation Modeling

#### *Measurement Model (Models 1a and 1b)*

Development of a structural model of faculty–student interaction outside the classroom advanced through several stages. We first fit a measurement model (Model 1a; GFI = .883; AGFI = .850; TLI = .861; CFI = .882; RMSE = .078) in which the latent variables were allowed to covary but their indicator variables were not allowed to covary in any way. The fit statistics for this model are less than ideal. However, when the measurement model was modified to allow the error terms of indicator variables to vary within a given latent construct—a more realistic representation of the likely relationships between teaching practices—the model fit improves to a satisfactory level (Model 1b, see Table 4; GFI = .931; AGFI = .906; TLI = .914; CFI = .931; RMSE = .062;). Combined with the high internal consistency of the individual scales ( $0.751 < \text{Cronbach's } \alpha < 0.905$ ), this improved model fit indicates a meaningful specification of the latent variables under consideration in this analysis.

#### *Reduced-Form Baseline Model (Model 2)*

Next, we fit a reduced-form baseline model that contained only the exogenous background characteristics and the two latent outcome variables. The results essentially mirror the results from the basic descriptive statistics. The parameter estimates in this model represent the *total* effect of exogenous variables on the frequency of interaction and explain 2.4 and 1.0% of the variance in casual and substantive interaction frequencies, respectively (see Table 5). It is against these coefficients that the direct effects in subsequent models will be compared when examining how teaching practices and job structures mediate the relationship between faculty member characteristics and the frequency of their out-of-class interaction with students.

<sup>1</sup> Intra-class correlation for “casual” interaction scale =  $2.94/(95.21 + 2.94) = 0.030$ . Intra-class correlation for “substantive” interaction scale =  $0.29/(14.30 + 0.29) = 0.020$ .

**Table 4** Measurement model (Model 1b) specification: standardized factor loadings

Indicator variable		Latent construct	Beta weight
q18b_FSX_greetings	←	Casual_FSX	0.696
q18f_FSX_casual_conversations	←	Casual_FSX	0.906
q18g_FSX_non_academic	←	Casual_FSX	0.819
q18c_FSX_career	←	Substantive_FSX	0.772
q18e_FSX_personal	←	Substantive_FSX	0.809
q18a_FSX_intellectual	←	Substantive_FSX	0.609
q16a_lecture_reverse	←	ATA	0.528
q16k_multiple_choice_reverse	←	ATA	0.296
q16f_multiple_drafts	←	ATA	0.612
q16n_student_presentations	←	ATA	0.690
q16b_discussion	←	ATA	0.624
q16c_collaborative	←	LTA	0.835
q16d_experiential	←	LTA	0.636
q16e_group	←	LTA	0.718
q16q_hands_on	←	LTA	0.603
q16r_application	←	LTA	0.533
q16i_frequent_feedback	←	FB	0.742
q16j_detailed_feedback	←	FB	0.914
q19d_wrestle_with_ideas	←	PED	0.817
q19b_examine_other_ideas	←	PED	0.883
q19a_2_attitudes_values	←	PED	0.812
q19a_1_background	←	PED	0.798

*Notes* See Table 1 for details about survey items. *Casual\_FSX* Casual Faculty–Student Interaction, *Substantive\_FSX* Substantive Faculty–Student Interaction, *ATA* Active Teaching and Assessment, *LTA* Learning Through Application, *FB* Feedback to students, *PED* Promoting Encounters with Difference

### Full Recursive Model (Model 3)

Next we fit a recursive model complete with all variables representing instructors' pedagogical practices and job structure. This model explained 9.2 and 11.0% of the variability in casual and substantive interaction, respectively (Table 5). Although the model is far from parsimonious, its fit statistics are adequate to make interpretation of results meaningful (GFI = .932; AGFI = .896; TLI = .877; CFI = .914; RMSE = .053).

Comparison of the exogenous variable direct effects in this model to their total effects (from Model 2) provides evidence of few mediating effects. The last column in Table 5 suggests that the effects of race, field, and reason for teaching are not mediated by pedagogical practices or job structures. A comparison between coefficients for the reduced form and fully recursive models indicates that the effects of part-time status, however, do appear to be fully explained away; conversely, the direct effect of being female is actually significantly increased—negatively—when pedagogical practices and job structures are modeled as mediating variables. To partition the mediating effects on these two exogenous variables between pedagogical practices and job structures we returned to our baseline model and added the two sets of mediating variables separately.

**Table 5** Direct effects of personal characteristics on frequency of faculty–student interaction: total mediating effects of pedagogical *and* occupational practices

	Reduced form (Model 2)			Fully recursive (Model 3)			Diff. signif.
	b	SE	Signif.	b	SE	Signif.	
<b>Casual interaction</b>							
Female	−0.72	0.52	0.163	−2.45	0.56	0.000	0.024
White	2.72	0.80	0.000	3.29	0.80	0.000	0.615
Humanities	2.66	0.64	0.000	2.18	1.56	0.162	0.775
Social science	0.54	0.75	0.473	0.92	1.06	0.386	0.767
Professional	3.63	1.10	0.001	3.33	1.23	0.007	0.855
Other field	1.41	1.15	0.221	1.67	1.37	0.223	0.885
Desire to teach	1.78	0.53	0.000	1.38	0.57	0.016	0.605
Part-time	−3.58	1.06	0.000	−0.02	1.18	0.990	0.024
	<i>r</i> -square:	0.024		<i>r</i> -square:	0.092		
<b>Substantive interaction</b>							
Female	0.08	0.12	0.543	−0.40	0.13	0.002	0.008
White	0.08	0.19	0.674	0.24	0.19	0.197	0.548
Humanities	0.34	0.15	0.028	0.36	0.37	0.327	0.948
Social science	0.00	0.18	0.993	0.27	0.25	0.287	0.388
Professional	0.70	0.26	0.008	0.73	0.29	0.011	0.927
Other field	0.22	0.28	0.416	0.31	0.32	0.340	0.840
Desire to teach	0.33	0.13	0.010	0.28	0.14	0.041	0.791
Part-time	−0.62	0.25	0.015	0.22	0.28	0.424	0.026
	<i>r</i> -square:	0.010		<i>r</i> -square:	0.110		

#### *Occupational Practices Model (Model 4)*

We suspected that the effects of being a part-time faculty member were mediated primarily through the set of variables representing one's occupational activities. The results from Model 4 (GFI = .978; AGFI = .933; TLI = .887; CFI = .959; RMSE = .056) confirmed our suspicion. While explaining 7.7 and 9.0% of the total variance in casual and substantive interaction, respectively, the occupational practices variables completely explained the effects of part-time status (see Table 6). Coefficients for the direct relationship between part-time status and levels of interaction went from being significantly negative in the baseline model to being statistically non-significant (*p*-value of difference between models' coefficients is .015 for casual interaction, .017 for substantive).

While the occupational activities variables explained away the effect of being part-time, it provided no statistically significant mediation of the female effect. Still perplexed by the lingering negative direct effect of being female, we removed the job structure variables and inserted the set of pedagogical practices to create Model 5.

#### *Pedagogical Practices Model (Model 5)*

Model 5 included only the exogenous faculty background and endogenous teaching variables as predictors of casual and substantive interaction (GFI = .941; AGFI = .912; TLI = .906; CFI = .933; RMSE = .051). This model explained 5.7 and 5.6% of the total

**Table 6** Direct effects of personal characteristics on frequency of faculty–student interaction: mediating effects of occupational practices

	Reduced form (Model 2)		Occupational practices only (Model 4)		z-stat	Diff. signif.
	b	SE	b	SE		
<b>Casual interaction</b>						
Female	−0.72	0.52	−1.33	0.53	0.82	0.414
White	2.72	0.80	2.61	0.79	0.09	0.926
Humanities	2.66	0.64	2.85	0.63	0.20	0.839
Social science	0.54	0.75	1.15	0.74	0.58	0.561
Professional	3.63	1.10	4.22	1.09	0.38	0.705
Other field	1.41	1.15	1.66	1.14	0.15	0.878
Desire to teach	1.78	0.53	1.74	0.53	0.06	0.954
Part-time	−3.58	1.06	0.26	1.17	2.43	0.015
	<i>r</i> -square:	0.024	<i>r</i> -square:	0.077		
<b>Substantive interaction</b>						
Female	0.08	0.12	−0.11	0.12	1.05	0.294
White	0.08	0.19	0.09	0.19	0.03	0.973
Humanities	0.34	0.15	0.37	0.15	0.15	0.881
Social science	0.00	0.18	0.17	0.17	0.65	0.513
Professional	0.70	0.26	0.87	0.26	0.45	0.649
Other field	0.22	0.28	0.23	0.27	0.01	0.992
Desire to teach	0.33	0.13	0.36	0.12	0.21	0.834
Part-time	−0.62	0.25	0.28	0.28	2.38	0.017
	<i>r</i> -square:	0.010	<i>r</i> -square:	0.090		

variance in casual and substantive interaction, respectively (see Table 7). As expected, the effects of being part-time do not appear to be mediated by teaching practices. Of greater interest, however, is the influence of teaching practices on the direct effects of being female. With casual interaction as the latent outcome variable of interest, the coefficient from female rose from a statistically non-significant  $-0.72$  in the baseline model to a statistically significant  $-1.94$  in the pedagogical practices model (Model 5,  $p$ -value of difference = 0.104); similar results were observed for substantive interaction, with the coefficient from female rising from a statistically non-significant 0.08 in the baseline model to a statistically significant  $-0.26$  in Model 5 ( $p$ -value of difference = 0.057). While neither of these changes in the coefficients reach formal levels of statistical significance, they are indicative of the unusual manner in which female faculty members' levels of interaction are affected by their teaching practices.

### Gender-Split-Sample Models

Still perplexed by the findings related to gender, we took additional steps to isolate the influence of teaching behavior on the frequency of female instructors' out-of-class interaction with students. With previous models suggesting that teaching practices have different effects for males and females, we employed multi-group analysis to fit like-specified models simultaneously to gender-homogenous groups. With this multi-group process, we re-ran the pedagogical practices model (Model 5) to create Model 6 (GFI = .935;

**Table 7** Direct effects of personal characteristics on frequency of faculty–student interaction: mediating effects of pedagogical practices

	Reduced form (Model 2)		Pedagogy only (Model 5)		z-stat	Diff. signif.
	b	SE	b	SE		
<b>Casual interaction</b>						
Female	−0.72	0.52	−1.94	0.54	1.63	0.104
White	2.72	0.80	3.55	0.80	0.74	0.462
Humanities	2.66	0.64	−0.34	1.58	1.76	0.079
Social science	0.54	0.75	−1.17	1.04	1.33	0.183
Professional	3.63	1.10	1.91	1.28	1.02	0.308
Other field	1.41	1.15	0.34	1.40	0.59	0.556
Desire to teach	1.78	0.53	1.14	0.59	0.82	0.414
Part-time	−3.58	1.06	−3.56	1.06	0.01	0.990
	<i>r</i> -square:	0.024	<i>r</i> -square:	0.057		
<b>Substantive interaction</b>						
Female	0.08	0.12	−0.26	0.13	1.90	0.057
White	0.08	0.19	0.28	0.19	0.74	0.459
Humanities	0.34	0.15	−0.20	0.38	1.30	0.193
Social science	0.00	0.18	−0.25	0.25	0.82	0.413
Professional	0.70	0.26	0.38	0.31	0.80	0.426
Other field	0.22	0.28	0.08	0.34	0.34	0.732
Desire to teach	0.33	0.13	0.18	0.14	0.77	0.440
Part-time	−0.62	0.25	−0.60	0.25	0.05	0.960
	<i>r</i> -square:	0.010	<i>r</i> -square:	0.056		

AGFI = .904; TLI = .907; CFI = .932; RMSE = .036) and the complete recursive model (Model 3) to create Model 7 (GFI = .933; AGFI = .900; TLI = .895; CFI = .925; RMSE = .035). The results from these final two models are presented in Table 8.

Initial comparison of the coefficients for males and females suggests our suspicion—that teaching practices are differently predictive of out-of-class interaction for men versus women—has some support in the data. Most of the coefficients are larger (more positive) for males than for females. In fact, in Model 6, four of the eight relevant coefficients are statistically significant and positive for males while the same can be said for only one of the coefficients for females. In Model 7, two of the coefficients for males are statistically significant and positive; none of the coefficients reach statistical significance for the female sample.

However, when compared using the most appropriate *z*-statistic (Paternoster et al. 1998) with pooled standard deviation and two-tailed significance test, few of these apparent differences in coefficients achieve statistical significance. The only statistically significant gender-related difference in coefficients occurs for the Promoting Encounters with Difference coefficient for casual interaction.

## Discussion

Overall, and consistent with decades of previous research, faculty members appear to have relatively little contact with students outside of the classroom. While the general lack of

**Table 8** Gender differences in effects of pedagogical practices on out-of-class interaction

	Pedagogy only (Model 6)					Fully recursive model (Model 7)				
	Males	SE	Females	SE	Diff. signif.	Males	SE	Females	SE	Diff. signif.
Casual interaction										
Learning through application	3.18	2.01	-0.49	1.64	0.157	2.50	1.94	-0.42	1.60	0.246
Active teaching & assessment	-1.94	5.78	4.12	4.75	0.418	-1.58	5.60	3.98	4.63	0.444
Feedback to students	1.52	0.93	1.06	1.04	0.745	1.19	0.91	0.58	1.01	0.653
Promoting encounters with difference	3.41	1.29	0.04	1.07	0.044	2.76	1.25	-0.77	1.05	0.030
Substantive interaction										
Learning through application	0.90	0.42	-0.01	0.51	0.167	0.72	0.39	0.03	0.49	0.268
Active teaching & assessment	-0.90	1.19	0.94	1.47	0.330	-0.78	1.13	0.90	1.41	0.351
Feedback to students	0.54	0.19	0.69	0.32	0.684	0.47	0.18	0.50	0.31	0.929
Promoting encounters with difference	0.63	0.26	0.08	0.33	0.192	0.47	0.25	-0.23	0.32	0.083

Notes  $z$  statistic and two-tailed significance calculated using the formula recommended by Paternoster et al. (1998)

out-of-class interaction is itself an unremarkable finding, the distribution of faculty responses is particularly poignant. Using the median and modal frequencies as points of reference, our results imply that, among those who have recently taught courses serving primarily first-year students, the majority of faculty members scarcely have any substantive interaction with first-year students outside of class.

In addition, the relative frequency of casual interaction versus substantive interaction may be a cause for concern. Although some have argued that seemingly trivial interactions can help humanize an institution (Colwell and Lifka 1983; Cox and Orehovec 2007), the research literature has consistently emphasized the educational value of substantive interactions. It is troubling, then, that faculty members' substantive interactions are far less frequent than are their more casual contacts with students. In sum, if institutions of higher education wish to fully exploit the educational potential of non-classroom interactions between students and the faculty, our results indicate that there is much opportunity for improvement.

#### Interactions by Contingent Faculty Members

The descriptive statistics and structural models from this study indicate that part-time faculty members interact with students less frequently than do their full-time peers. This finding is consistent with other recent work that questions the efficacy of using part-time instructors (Eagan and Jaeger 2008; Ehrenberg and Zhang 2005; Umbach 2007). Our study also provides some support for Eagan and Jaeger's (2008) suspicion that lower student persistence associated with part-time instructors result from these professors' lack of availability for student interaction beyond the classroom. The full-time/part-time differences in out-of-class interaction are entirely explained by the difference in hours these

instructors devote to an institution; indeed, part-time faculty interact less frequently with students, but they do so precisely because they are *part-time* employees.

The importance of time spent on campus is further highlighted by our finding relative to tenure status. Our descriptive statistics suggest that non-tenure-track professors have as much or more frequent interaction with students outside of class—particularly that which is substantive in nature—than do their tenure-line colleagues. The analysis we have conducted here treated rank as an early endogenous variable, making it difficult to explain the non-tenure-track finding from the descriptive statistics. However, the findings relative to full-time/part-time status and tenure status prompt several questions. Are full-time tenure-ineligible faculty members more committed to teaching than to research (Ehrenberg 2005)? Are they more early-career scholars who themselves had instructors who used more engaging pedagogical and out-of-class practices? Or are they simply those who have been assigned to more, and larger, first-year classes, thus giving them more students with whom to interact outside of class? Regardless, future research might wish to distinguish between *types* of contingent faculty, as was done by Eagan and Jaeger (2008) and Umbach (2007).

### Gender-Related Effects of Pedagogical Practices

Female instructors in our study have less frequent interaction with students outside of class—especially casual interaction—than do their male counterparts. However, females' less frequent interaction appears not to be the result of any lack of effort to use effective pedagogical techniques. In fact, women in our study engage in effective pedagogies (e.g., feedback to students, student presentations, group discussions) more often than men. But our results suggest possible, if only sporadically statistically significant, gender differences in the effects of these pedagogical practices on out-of-class interaction. In particular, results indicate that when faculty members promote encounters with difference within the classroom, the practice results in more frequent out-of-class contacts for male faculty members, but not for females. Moreover, when such pedagogical practices are statistically controlled, the gender differences in out-of-class student contact actually *increase*. Together, these findings suggest that female instructors do not receive equal out-of-class returns from their in-class efforts to engage with students. We suspect that these gender-specific outcomes may be the result of students' gender-specific expectations for instructors.

Students see more female than male teachers throughout elementary and high school, with 72.9% of k-12 teachers being female (National Center for Educational Statistics 2007). The earliest grades are particularly devoid of male teachers (only 15.7%), and male instructors only become common (47.9%) in the secondary-school setting (National Center for Educational Statistics 2007). Students' elementary years, those most likely to be filled with female teachers, are also the years in which students tend to have relationships with teachers that encompass the whole student, not just a narrow academic subject. Thus, students may enter college with unconscious expectations that female instructors will be more personable and engaging than male faculty members. The current evidence is mixed, however, with at least one study finding a relationship between instructor gender and student preconceptions (Moore and Trahan 1997) while another (Anderson and Smith 2005) found no such relationship. Regardless, we speculate that male professors who defy student expectations by employing hands-on teaching practices, or those that encourage student interaction with diverse peers and ideas, may be viewed by students as uniquely or especially interested in students and, therefore, more likely to experience out-of-class contact with students.

## Faculty Signals of Approachability

Wilson et al. (1974) hypothesized that faculty members' in-class behaviors serve as signals to students indicating an instructor's openness for out-of-class contact. In testing that hypothesis, we found that only 9 and 11% of the variance in out-of-class interaction can be explained by either the instructors' classroom pedagogies or professional activities. While we have explored pedagogical practices as potential signals, it may be that students are tuned in to more subtle indicators. Tone of voice, facial expressions, and other non-verbal—often unintentional—signals may be more important than the presentations or assignments given by the professor. So, too, might a professor's level of preparation for class or the manner in which office hours are listed on the syllabus affect students' perceptions of faculty openness. Although we are unable to support the hypothesis that faculty send signals to students via their pedagogical practices, we can make no claim regarding other faculty behaviors that might serve as signals.

By that same token, however, it may be that Wilson, Wood, and Gaff's (1974) signaling hypothesis is actually incorrect. Collectively, instructors' gender, race, field, rank, time commitments, and pedagogical practices have relatively little predictive power (low *r*-square values) on the frequency of their out-of-class contacts with students. Moreover, the effects of classroom pedagogy on out-of-class interaction are inconsistent and vary across gender and full-time/part-time status. While we recognize that there are countless ways in which faculty *might* send signals to students, we have effectively dismissed the most logical set of potential signaling behaviors.

Yet another interpretation of our findings is that faculty behaviors are *not* the biggest predictors of their likelihood to engage students outside of class. Rather, it may be that the student side of the faculty–student interaction equation is actually the driving force and that the variability attributable to the faculty members themselves is relatively minor. Perhaps students enter a particular class with a predisposition to either engage with instructors outside of class or to avoid such out-of-class contact. Unfortunately, methodological limitations make such a hypothesis impossible to test with the current dataset. Those same limitations make it difficult for any study to effectively parse out the reciprocal influences of faculty members and students.

## References

- Anaya, G., & Cole, D. G. (2001). Latina/o student achievement: Exploring the influence of student–faculty interactions on college grades. *Journal of College Student Development*, 42(1), 3–14.
- Anderson, K. J., & Smith, G. (2005). Students' preconceptions of professors: Benefits and barriers according to ethnicity and gender. *Hispanic Journal of Behavioral Sciences*, 27(2), 184–201.
- Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
- Chang, J. C. (2005). Faculty student interaction at the community college: A focus on students of color. *Research in Higher Education*, 46(7), 769–802.
- Cole, D. (2007). Do interracial interactions matter? An examination of student–faculty contact and intellectual self-concept. *Journal of Higher Education*, 78(3), 249–281.
- Colwell, B. W., & Lifka, T. E. (1983). Faculty involvement in residential life. *The Journal of College and University Student Housing*, 13(1), 9–14.
- Cotten, S. R., & Wilson, B. (2006). Student–faculty interactions: Dynamics and determinants. *Higher Education*, 51(4), 487–519.
- Cox, B. E., & Orehovec, E. (2007). Faculty–student interaction outside the classroom: A typology from a residential college. *Review of Higher Education*, 30(4), 343–362.

- Eagan, M. K., & Jaeger, A. J. (2008). Closing the gate: Part-Time faculty instruction in gatekeeper courses and first-year persistence. *New Directions for Teaching and Learning*, 2008(115), 39–53.
- Ehrenberg, R. G. (2005). The changing nature of the faculty and faculty employment practices (CHERI Working Paper #78) [Electronic Version]. *Cornell University, ILR School*. Retrieved March 20, 2009 from <http://digitalcommons.ilr.cornell.edu/workingpapers/60/>.
- Ehrenberg, R. G., & Zhang, L. (2005). Do tenured and tenure-track faculty matter? *The Journal of Human Resources*, 40(3), 647.
- Einarson, M. K., & Clarkberg, M. E. (2004). *Understanding faculty out-of-class interaction with undergraduate students at a research university*. Paper presented at the Association for the Study of Higher Education.
- Gellin, A. (2003). The effect of undergraduate student involvement on critical thinking: A meta-analysis of the literature 1991–2000. *Journal of College Student Development*, 44(6), 746–762.
- Golde, C. M., & Pribbenow, D. A. (2000). Understanding faculty involvement in residential learning communities. *Journal of College Student Development*, 41(1), 27–40.
- Hathaway, R. S., Nagda, B. A., & Gregerman, S. R. (2002). The relationship of undergraduate research participation to graduate and professional education pursuit: An empirical study. *Journal of College Student Development*, 43(5), 614–632.
- Ishiyama, J. (2002). Does early participation in undergraduate research benefit social science and humanities students? *College Student Journal*, 36, 380–386.
- Jacob, P. (1957). *Changing values in college: An exploratory study of the impact of college teaching*. New York: Harper.
- Kim, Y. K., & Sax, L. J. (2007). *Different patterns of student–faculty interaction in research universities: An analysis by student gender, race, SES, and first-generation status*. Berkeley, CA: Center for Studies in Higher Education at UC Berkeley.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford Press.
- Kuh, G. D., & Hu, S. (2001). The effects of student–faculty interaction in the 1990s. *Review of Higher Education*, 24(3), 309–332.
- Lundberg, C. A., & Schreiner, L. A. (2004). Quality and frequency of faculty–student interaction as predictors of student learning: An analysis by student race/ethnicity. *Journal of College Student Development*, 45(5), 549–565.
- Moore, M., & Trahan, R. (1997). Biased and political: Student perceptions of females teaching about gender. *College Student Journal*, 31(4), 434–444.
- Nagda, B. A., Gregerman, S. R., Jonides, J., von Hippel, W., & Lerner, J. S. (1998). Undergraduate student–faculty research partnerships affect student retention. *Review of Higher Education*, 22(1), 55–72.
- National Center for Educational Statistics. (2007). *The condition of education*. Washington, D. C.: US Department of Education.
- National Survey of Student Engagement. (2008). *Promoting engagement for all students: The imperative to look within (2008 results)*. Bloomington: Indiana University Center for Postsecondary Research.
- Nettles, M. T., Thoeny, A. R., & Gosman, E. J. (1986). Comparative and predictive analyses of Black and White students' college achievement and experiences. *The Journal of Higher Education*, 57(3), 289–318.
- Pascarella, E. T. (1980). Student–faculty informal contact and college outcomes. *Review of Educational Research*, 50(4), 545–595.
- Pascarella, E. T., & Terenzini, P. T. (1977). Patterns of student–faculty informal interaction beyond the classroom and voluntary freshman attrition. *The Journal of Higher Education*, 48(5), 540–552.
- Pascarella, E. T., & Terenzini, P. T. (1991). *How college affects students (vol. 1). Findings and insights from twenty years of research*. San Francisco: Jossey-Bass Publishers.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students (vol. 2). A third decade of research*. San Francisco: Jossey-Bass.
- Pascarella, E. T., Terenzini, P. T., & Hibel, J. (1978). Student–faculty interactional settings and their relationship to predicted academic performance. *The Journal of Higher Education*, 49(5), 450–463.
- Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology*, 36(4), 859–866.
- Porter, S. R. (2005). What can multilevel models add to institutional research? In *Applications of Advanced Statistics in Institutional Research* (pp. 110–131). Association for Institutional Research.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Calif. Sage: Thousand Oaks.
- Reason, R. D., Terenzini, P. T., & Domingo, R. J. (2006). First things first: Developing academic competence in the first year of college. *Research in Higher Education*, 47(2), 149–175.

- Reason, R. D., Terenzini, P. T., & Domingo, R. J. (2007). Developing social and personal competence in the first year of college. *Review of Higher Education, 30*(3), 271–299.
- Rudolf, F. (1962). *The American college and university: A history*. New York: Vintage.
- Sax, L. J., Bryant, A. N., & Harper, C. E. (2005). The differential effects of student–faculty interaction on college outcomes for women and men. *Journal of College Student Development, 46*(6), 642–659.
- Schwitzer, A. M., Griffin, O. T., Ancis, J. R., & Thomas, C. R. (1999). Social adjustment experiences of African American college students. *Journal of Counseling & Development, 77*(2), 189–197.
- Snow, S. G. (1973). Correlates of faculty–student interaction. *Sociology of Education, 46*(4), 489–498.
- Terenzini, P. T., & Reason, R. D. (2005). Parsing the first year of college: A conceptual framework for studying college impacts. Paper presented at the annual meeting of the Association for the Study of Higher Education. Philadelphia.
- Umbach, P. D. (2007). How effective are they? Exploring the impact of contingent faculty on undergraduate education. *Review of Higher Education, 30*(2), 91–123.
- Vianden, J. (2006). *“I don’t need any help”: What first year college men say about interacting with faculty outside of the classroom*. Doctoral Dissertation. Indiana University, Bloomington.
- Wawrzynski, M. R., & Sedlacek, W. E. (2003). Race and gender differences in the transfer student experience. *Journal of College Student Development, 44*(4), 489–501.
- Wilson, R. C., Gaff, J. G., Dienst, R., Wood, L., & Bavry, J. (1975). *College professors and their impact on students*. New York: Wiley Interscience.
- Wilson, R. C., Wood, L., & Gaff, J. G. (1974). Social-psychological accessibility and faculty–student interaction beyond the classroom. *Sociology of Education, 47*(1), 74–92.