Understanding the STEM Faculty Approaches to Student Talent Development

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Abstract

A student talent development approach to teaching recognizes the diverse talents and educational backgrounds of undergraduate students and capitalizes on these diverse talents through utilizing various pedagogical approaches, ultimately challenging traditional notions of scientific talent. This study uses hierarchical linear modeling (HLM) on a national, cross-sectional survey data from 5,465 Science, Technology, Engineering, and Mathematics (STEM) faculty across 254 higher education institutions to investigate the individual and institutional factors that are associated with a student talent development approach. Findings indicate that there are several individual characteristics associated with a student talent development such as faculty rank and discipline, and several significant practices such as student-centered teaching and engaging students in undergraduate research. Institutional leadership and other educational stakeholders will be interested in these findings as they identify several campus structures significantly associated with cultivating students' talents in STEM disciplines.

Diversifying science, technology, engineering, and mathematics (STEM) disciplines is necessary for the U.S. to remain a global leader in advancing the technological and scientific enterprise (Olson & Riordan, 2012). Despite reform efforts, national data reveal that many students who aspire to complete a STEM degree do not achieve their intended goal (Hurtado, Chang, & Eagan, 2010). Additionally, disparities exist in STEM degree completion rates between underrepresented racial minority (URM) students, and their White and select Asian peers (National Science Foundation & National Center for Science and Engineering Statistics, 2013).

In order to account for these differential outcomes, research has focused on the nature and frequency of key curricular and co-curricular experiences students have in college. Within STEM classrooms, faculty's reliance on lecture versus active learning pedagogy (Gasiewski, Eagan, Garcia, Hurtado, & Chang, 2012), students' perceptions of an unwelcoming academic learning environment (Seymour & Hewitt, 1997), and inequitable access to enriching co-curricular activities (Figueroa, Hughes, & Hurtado, 2013) represent just a few of the college experiences and contexts cited for the poor retention of URM students in STEM majors. Yet the distribution of key curricular and co-curricular experiences varies by race and gender. One prime example of an inequitably distributed opportunity on campus is undergraduate research, with Black students being the least likely racial group to participate in undergraduate research unless there are structured research opportunities (Hurtado, Eagan, Cabrera, Lin, Park, & Lopez, 2009; Kim & Sax, 2009). This is partly due to lack of recognition for scientific talent and selection/invitation to participate (Bangera & Brownell, 2014; Hurtado et al., 2009).

Perhaps most salient are that faculty serve as gatekeepers to these curricular and co-curricular experiences and allocate these opportunities based on whom they conceptualize as having the potential for scientific talent (Bangera & Brownell, 2014). In other words, faculty members' assessment of which students possess talent shapes who they view as being worth further investment, which may help explain why URM students are less represented in the academic activities that facilitate degree completion. Thus, more research is needed on student talent development for the benefit of URM students in STEM.

The student talent development perspective originated as a critique to traditional means of measuring educational excellence at the institutional level (Astin, 1985; Astin & antonio 2012). Historically, educational excellence in higher education has been synonymous with selecting high achieving students who entered college already positioned to perform well academically, rather than devoting efforts to developing students from a broader range of educational backgrounds (Astin, 1985). To challenge this historical definition of educational excellence, Astin proposed the talent development model, wherein true excellence was conceptualized as institutions' "ability to affect its students and faculty favorably, to enhance their intellectual and scholarly development, and to make a positive difference in their lives" (Astin & antonio, p. 7). From this perspective, the most excellent institutions are those with the greatest impact on students and those that add the most value to their developing skills set.

In postsecondary classrooms, a talent development approach to teaching means that faculty use pedagogical and interactional practices that develop the base talents of all students and elicit a diverse skillset, rather than selecting already high-achieving students for further investment. However, STEM faculty have been criticized for modes of teaching that allow only a limited number of students to succeed, such as an overreliance on the lecture model, intentionally weeding-out 'less capable' students, and teaching classes with extremely large enrollments (Alberts, 2004; Handelsman et al., 2004; Seymour & Hewitt, 1997; Tobias, 1990). Given research indicating that a developmental approach is more beneficial for student achievement in STEM (Triesman, 1992), research is needed on the individual and institutional factors associated with faculty members' adoption of a student talent development approach to teaching in the classroom. Thus, the central research question guiding this study is: what are the individual and institutional level predictors of a talent development approach to teaching in the classroom? This study will aid college administrators in identifying the resources faculty need so that they are more likely to develop the incoming talents of students in STEM classrooms.

Literature Review

What is a Student Talent Development Approach to Teaching?

Rather than defining educational excellence as students' academic track record upon entering college – which can be measured by incoming standardized test scores and high school GPA –a talent development approach to excellence takes into account the effectiveness of faculty and the institution in developing the educational talents of their students (Astin, 1985; Astin & antonio, 2012). Although originally offered as a critique of higher education institutions' approach to excellence, this perspective can also apply to STEM classrooms. Similar to institutions, STEM departmental cultures have been critiqued for relying too heavily on classroom practices that sort and exclude students such as grading on a curve (Handelsman et al., 2004; Seymour & Hewitt, 1997), rather than capitalizing on their incoming academic aptitudes. These approaches sort highly prepared students from those presumed to have significantly less talent to engage in STEM related coursework, ultimately weeding many students out of STEM majors.

Alternatively, a student talent development approach to teaching encompasses those classroom teaching practices and dispositions that encourage students to recognize areas of ability they can strengthen, identify the learning gains they ought to exhibit, and gain the behaviors and dispositions of STEM professionals. For example, the provision of faculty feedback on assignments is an integral element to a student talent development approach to teaching. This practice acknowledges that students may not initially demonstrate a targeted skill perfectly on an assignment, but their mastery can nonetheless be improved with faculty guidance (Froyd, 2008; Hounsell, 2003; Ramsden, 2003). Setting clear expectations and explicitly linking learning outcomes to course assignments are essential to developing the talents of undergraduate students, as these practices create a learning environment wherein students clearly know what is expected of them and can assess on their own if they are not meeting intended learning benchmarks. Faculty can also use expectations for performance and learning outcomes as a tool to demystify the learning process for students, monitor student progress, and provide interventions when it is deemed necessary for student growth (Froyd, 2008).

Encouraging students to develop a variety of dispositions associated with the conduction of scientific research is also crucial to a student talent development approach to teaching. By encouraging students to make mistakes, take risks, and ask questions, faculty members show students that being a scientific researcher is not simply about knowing the proper content (knowledge acquisition), but also about knowing how to solve new problems that arise (knowledge discovery), and having the perseverance to do so in the face of setbacks. Indeed, research shows that students who more frequently ask questions in class derive several benefits including improved memory retention and performance (Thalheimer, 2003). It is also important for faculty to create a classroom climate that normalizes mistakes. Currently, many STEM classrooms are intentionally organized to position students in competition with each other for grades and academic status, with many students being unwilling to make mistakes for fear of being perceived as unintelligent by peers (Fries-Britt, Johnson, & Burt, 2013). Being severely underrepresented within STEM spaces, women and racial minorities students face the added burden of feeling as if they have to represent their identities in class (Fries-Britt & Griffin, 2007), which can hinder them from taking risks that can potentially yield significant learning gains. Further, professionals in the STEM community insist that mistakes are to be expected and are a cornerstone of scientific discovery (Hrabowski, 2015). Thus encouraging students to ask questions and see mistakes as learning opportunities, which can reduce competition and convey that learning is a give-and-take process.

Ultimately, a talent development approach to teaching does not simply focus on mastery and delivery of course content, but recognizes that learning is a process of adding value and elicits a diverse array of talents from students. It also serves as a more comprehensive view of scientific talent and invests in every student, not just those with the most impressive academic profiles. However, not much is known about the various factors associated with adopting a student talent development approach to teaching. We therefore draw on a larger literature base to examine those demographic characteristics and institutional climate variables that shape teaching behavior, and also examine the classroom practices indicative of a talent development approach to teaching.

Demographic Characteristics that Shape Teaching Behavior

A student talent development approach to teaching is likely shaped by individual background characteristics. For example, literature on faculty indicates that teaching loads vary between faculty of color compared to their White counterparts, with faculty of color engaging in greater amounts of teaching and student mentorship (Umbach, 2006; Villalpando & Delgado Bernal, 2002). Similarly, female faculty members have larger teaching loads and mentor students more often than their male counterparts (Bellas & Toutkoushian, 1999; Hurtado, Eagan, Pryor, Whang, & Tran, 2012; Link, Swan, & Bozeman, 2008). Although more time spent teaching and mentoring students can interfere with time committed to research activities (Bellas & Toutkoushian, 1999), more time spent with students is associated with the use of active pedagogical techniques (Knowles & Harleston, 1997) and more positive perceptions of student talent. Faculty of color also tend to employ the teaching techniques they experienced during graduate school and view talent in a way that reflects how their graduate advisors viewed talent (Figueroa, Gasiewski, Hurtado, & Garcia, 2013). Professional characteristics such as rank and discipline also matter, with full professors being less likely to use teaching techniques that promoted active learning compared to more junior faculty (Lindholm & Astin, 2008). Finally, research shows that certain disciplines such as engineering and physics are making incremental progress in improving their classroom pedagogies (Hake, 1998; Prince, 2004).

Faculty who spend more time preparing for teaching and who have been recognized for their outstanding teaching tend to engage in pedagogical practices that promote student engagement more frequently than those who are not (Lindholm & Astin, 2008). Further, faculty members that participate in professional development specific to teaching pedagogy report positive effects on their teaching (Austin, 1992). Yet in the face of a finite amount of time, balancing teaching and research can be difficult. Faculty may be compelled to prioritized one task over the other (Boyer, 1990), although engagement in both is expected (Fairweather, 2002). Previous research on faculty workloads indicates that faculty who engage in more research may have less time to improve their teaching (Astin & Chang, 2005). In another study of faculty productivity, Fairweather (2002) found that only 22 percent of the sampled faculty members were highly productive researchers and highly effective teachers, and only 6 percent of the sample achieved both accolades while simultaneously employing active and collaborative classroom practices. However, achieving higher research productivity does not necessarily have to translate to lesser use of pedagogy that is known to develop students (Figueroa, Wilkins, & Hurtado, 2016). Indeed, Figueroa and colleagues (2016) found that although the simple relationship between scholarly productivity and the use of student-centered pedagogies is initially negative, the relationship becomes significantly positive after including authentic forms of research in teaching – potentially creating room for faculty to enhance their research and student talent development approach. Additionally, engaging in structured research projects with undergraduate students exposes faculty members to students in a different academic setting (Malachowski, 1996), and this exposure to students in a different setting may impact how faculty perceive student ability in the classroom.

Classroom Approaches Indicative of a Talent Development Approach to Teaching

In an attempt to move away from an overreliance on lecture in STEM classrooms (Alberts, 2005; Seymour & Hewitt, 1997), a great deal of research has been conducted on the efficacy of student-centered teaching approaches and active learning pedagogies. In an extensive review of the literature, Prince (2004) defines the core elements of active learning in STEM classrooms as student activity and engagement in the learning process, which lies in direct contrast to traditional lecture in which students passively receive information from the professor. A variety of classroom approaches can be categorized as promoting active learning, which in turn may advance a talent development approach to teaching. For example, 'flipping the classroom,' is an active learning classroom format that has received significant attention in STEM education in recent years. In a flipped classroom, class time is dedicated to simulations, labs, experiments, and other activities wherein students learn by doing and observing. Before class, however, students are expected to read and watch videos and lectures online. Students receive the bulk of the content knowledge in the course via this out-of-class format (Zappe et al., 2009). Driving this approach to teaching is the idea that college students come from very different K-12 educational backgrounds and do not normally enter the class on an equal playing field; therefore, students with less exposure to the material will need additional materials available to them, which is accessible online via the course webpage. Indeed, students are exposed to personalized lessons out of class, which allows everyone within a flipped class the opportunity to start class having the same level of requisite knowledge, effectively making the classroom a setting where everyone can achieve.

Students enrolled in courses with flipped-classroom formats tend to exhibit greater learning gains, engage in more frequent questioning, and report being intimidated in class less often compared to peers in courses with extensive lecture-style formats (Marrs & Novak, 2004; Ruddick, 2012). Additionally, teaching that uses real-world problems is another form of inclusive science pedagogy, which typically incorporate student's motivations for pursuing science such as alleviating health disparities, and provides a space that is more conducive for creative learning (Allen & Tanner, 2005; Davis & Finelli, 2007; William, Poronnik, & Taylor, 2008).

Another practice associated with a talent development approach to teaching is collaborative learning. Research indicates that working in small groups in- and out-of-class provides students with the opportunity to learn from others with varying levels of content proficiency (Tresiman, 1992). As students teach the material to each other, they strengthen their own understanding of the material (Lundberg, 2003; Peters, 2005; Tresiman, 1990, 1992). Working in groups also has the potential to create cognitive conflict when students are in disagreement and forces them to contend with any points of inadequate reasoning and together reach a collective, enriched understanding of the topic. Collaborative learning also provides a space for students to demonstrate and build alternative cognitive skills necessary for success in the scientific workforce, such as communication, decision-making, and social ethic skills (Sankar, Kawulich, Clayton, & Raju, 2010).

Institutional Characteristics that prompt a Talent Development Approach to Teaching

The college environment is likely an important influence on the frequency by which faculty adopt a talent development approach to their teaching. In a study of faculty members' role in student learning and engagement, researchers found that faculty at more selective campuses were less likely to use teaching approaches that promote collaborative learning compared to faculty at less selective campuses (Umbach & Wawrynzski, 2005). Institutional type also mattered, with faculty at liberal arts colleges being more likely to academically challenge students and employ collaborative pedagogies compared to faculty at other institutional types. Research on minority-serving institutions (MSIs) explains that STEM faculty at these types of institutional types are more likely to share similar background traits as their students, such as race/ethnicity, SES, and K-12 background, which helped them understand and address the barriers to student achievement (Wilkins, Figueroa, Hurtado, Razo-Duenas, Mendoza, & Carter, 2016). Faculty at MSIs were also more likely to have an expansive understanding of what student talent is (Wilkins et al., 2016), likely because institutional cultures (which encompass institutional mission and the importance placed on teaching) vary considerably by institutional types (Austin, 1990). Colleges that are more explicit in their expectations for teaching tend to provide more recognition for meaningful faculty attempts to cultivate the talents of diverse students. Reward structures around merit pay, promotion, and tenure signal institutional priorities and also have a strong effect on faculty teaching and mentoring behavior (O’Meara, 2011).

Cycle of Socialization

This study draws from Harro’s (2000) cycle of socialization to understand those forces within the environment that shape individual attitudes and behavior. As applied to STEM faculty, the cycle of socialization can help shed light on why some faculty have a greater propensity to adopt a talent development approach to teaching over others.

Within the cycle of socialization are three stages: first socialization, institutional and cultural socialization, and results. In the first stage, Harro argues that individuals are born into a social system wherein they take on a specific set of socially constructed identities ─ such as race, gender, and socioeconomic status (Harro, 2000). The social environments in which people are born into have unspoken rules for behavior and roles for people to play based on the multiplicity of identities a person possesses. In effect, some identities are oppressed by others (Harro, 2000). Unspoken rules also shape the norms of the environment and signal appropriate standards of behavior for people. As it relates to this study, the first stage of socialization suggests that the social identities of faculty members are important considerations in predicting the pedagogical methods they use in the classroom. For example, socialization may partially explain why female faculty members engage in greater amounts of service and take on heavier teaching loads compared to their male counterparts, but engage in less research (Mitchell & Hesli, 2013).

In the second stage of socialization, individuals receive messages from the institutions and sectors operating around them ─ such as schools, churches, and business ─ and internalize the roles they should play within those organizations. The socialization that occurs in these settings can both confirm and contradict the effects of socialization from stage one. Further, within the institutional environment, rules for behaving and the assumed roles people are expected to fill determine normative practices, which do not treat everyone fairly (Harro, 2000, p. 17). Further, rewards and stigmatizations ensure that the norms and assumptions of the organizational culture seamlessly operate; individuals who attempt to contradict these norms may be treated unfavorably. Finally, Harro (2000) explains that the identities of the individual, along with the socialization of the individual from their environments, contribute to the solidification of an individual's attitudes, which represent the third stage of the cycle of socialization. With respect to this study, the second and third stages of socialization suggest that as actors within the institutions in which they received their graduate training and later as instructors and researchers on college campuses, faculty come to learn both what it means for students to have STEM talent and the teaching and mentoring practices appropriate to cultivating said talent.

Applied to higher education, the predominance of lecture-style teaching in STEM disciplines and the reward system that preserves this approach to teaching (especially at research-intensive institutions) is an example of how the socialization process shapes teaching behavior. Faculty at research-intensive institutions tend to be discouraged to significantly invest time into teaching activities, because of expectations for high research productivity for promotion and tenure (Boyer, 1990). Further, senior faculty members may convey messages to junior faculty that student-centered teaching approaches will not be rewarded (Tierney, 1997). Therefore, faculty members that go against the norms around teaching at their respective institutions or their respective STEM departments, and opt to use student-centered teaching practices rather than lecture-style teaching practices, may be reviewed less favorably in the promotion and tenure process by more senior colleagues. Adopting a student talent development approach to teaching is therefore likely influenced by the type of institution that faculty teach at, organizational priorities, access to professional development, and the climate around teaching and learning at the institution and department levels. A student talent development approach to teaching also challenges the teaching status quo as it moves away from a reliance on lecture and curved grading, both of which effectively weed out all but the highest performing students.

Methods

Sample & Descriptive Statistics

To investigate the factors that predict a student talent development approach to teaching, this study utilizes cross-sectional data from the 2013-2014 Faculty Survey administered by UCLA's Higher Education Research Institute. The Faculty Survey collects data on how faculty members spend their time, their classroom practices, perceptions of institutional climate, and personal and professional goals. (See Eagan et al., 2014 for more details about the survey and methodology). After filtering out faculty members that did not teach in STEM disciplines, the final sample for this study included 5,465 STEM faculty across 254 four-year institutions.

With respect to the faculty in this sample, 44.3% identified as female, with the other 55.7% identifying as male. In regard to rank, the sample constituted of 35.1% full professors, 26.6% associate professors, 25.5% assistant professors, 5% instructors, and 7.9% lecturers. Descriptive statistics also show that 15.6% of the faculty members in the sample were in engineering and computer science departments, 25.2% in life sciences, and 23.8% in health sciences, with the remaining 33.2% comprising the reference group – physical sciences. Finally, 14.6% of faculty identified as being faculty of color, meaning that they identified as being either American Indian, Asian, Black, Hispanic, other, or of being more than one race.

Variables

The outcome variable for this study was a factor indicating a student talent development approach to teaching. The student talent development construct consisted of nine survey items that were described in the literature review and represent the frequency with which faculty engaged in a variety of teaching practices and encouraged classroom behaviors among students known to cultivate student talent. A higher score on this measure signifies that faculty more frequently engaged in practices that cultivate scientific talent. The dependent variable was constructed using principal axis factoring with promax rotation. Table 1 provides the factor loadings of items and the Cronbach's alpha score (.753) for the dependent variable. The predictor variables for this study were grouped into conceptual blocks according to the theoretical framework and prior literature. Table 2 provides the descriptive statistics for each variable, Appendix A provides the coding schemes for the independent variables, and Appendix B provides the factor loadings for items that comprised the constructs that were used as predictor variables.

Table 1: Dependent Variable - Student Talent Development Factor

Scale & Items	
Student Talent Development Approach	**Factor Loading**
	α=.753
Seek solutions to problems and explain them to others*	0.600
Accept mistakes as part of the learning process*	0.565
Revise their papers to improve their writing*	0.532
Take risks for potential gains*	0.524
Ask questions in class*	0.512
Explain what you want students to gain from the assignment**	0.502
Provide in advance the criteria for evaluating the assignment**	0.488
Explicitly link the assignment with course goals or learning objectives**	0.484
Provide feedback on drafts or work still in progress**	0.476

***In your interactions with undergraduates, how often do you encourage them to:**
1=Not at all, 2=Occasionally, 3=Frequently
****In creating assignments for your courses, how often do you:**
1=Not at all, 2=Occasionally, 3=Frequently

Table 2: Descriptive statistics

Descriptive Statistics n = 5,465 faculty, n=254 institutions

		Mean	St. Dev.	Min	Max
Dependent variable: Student Talent Development Approach		50	8.28	20.87	61.09
Block 1: Demographic Characteristics					
	Sex (Female)	1.44	0.50	1	2
	Faculty of Color	1.14	0.34	1	2
Block 2: Faculty Characteristics					
	Professor (Reference)	1.36	0.48	1	2
	Associate Professor	1.27	0.44	1	2
	Assistant Professor	1.24	0.43	1	2
	Lecturer	1.05	0.22	1	2
	Instructor	1.08	0.27	1	2
	Physical Sciences				
	Life Sciences	1.21	0.41	1	2
	Engineering & Computer Science	1.14	0.35	1	2
	Health Sciences	1.00	0.04	1	2
Block 3: Research Activities					
	Scholarly Productivity (Factor)	50	9.14	37.10	75.78
	Importance: Research	3.06	0.92	1	4
	Hours per week: Research & scholarly writing	2.96	1.82	1	7
Block 4: Research Activities with Undergraduate Students					
	Research with undergraduate students (Factor)	50	9.03	34.99	65.94
Block 5: Teaching Activities					
	Taught an honors course	1.14	0.35	1	2
	Taught an interdisciplinary course	1.33	0.47	1	2
	Taught a seminar for first-year students	1.18	0.38	1	2
	Importance: Teaching	3.70	0.54	1	4
	Hours per week: Preparing for teaching	3.85	1.69	1	7
	Hours per week: advising and counseling of students	2.49	0.97	1	7
	Hours per week: Committee work and meetings	2.39	0.96	1	7
	Affect: Mentor undergraduate students	2.48	0.64	1	3
	Importance: Teaching	3.70	0.54	1	4
	Importance: Service	2.82	0.77	1	4
Block 6: Professional Development					
	Paid workshops outside of the institution focused on teaching	1.25	0.44	1	2
	Incentives to develop new courses	1.19	0.39	1	2

	Incentives to integrate new technology into your classroom	1.26	0.44	1	2
Block 7: Teaching Practices					
	Extensive lecturing	2.76	0.96	1	4
	Using real-life problems	3.19	0.91	1	4
	Using student inquiry to drive learning	2.67	0.96	1	4
	"Learn before lecture" through multimedia tools (e.g. flipping the classroom)	1.87	0.93	1	4
	Supplemental instruction that is outside of class and office hours	2.31	1.00	1	4
	Grading on a curve	1.83	1.03	1	4
	Student Centered pedagogy	50	9.12	31.28	73.00
Block 8: Institutional Climate					
	Faculty are interested in students' personal problems	2.95	0.73	1	4
	Faculty here are strongly interested in the academic problems of undergraduates	3.37	0.70	1	4
	Is it easy for students to see faculty outside of regular office hours	2.53	0.58	1	3
	Faculty are rewarded for being good teachers	2.00	0.71	1	3
	Institutional Priority: Increasing Prestige (Factor)	50	9.25	29.93	64.32
	Institutional Priority: Diversity (Factor)	50	9.47	31.79	70.11
Block 9: Institutional Characteristics					
	Selectivity	65.08	17.71	9	99
	Control (vs. Private)	1.69	0.46	1	2
	HBCU (vs. Non-HBCU)	0.03	0.16	0	1
	Institutional Size	2.74	1.09	1	5
	FTE (1,000)	7.10	8.91	.04	1.36
	Undergraduate Enrollment (1,000)	6.42	7.80	.033	4.47
	Baccalaureate	1.35	0.48	1	2
	Masters (Reference)	1.45	0.50	1	2
	Research	1.20	0.40	1	2

The first block of variables in this analysis represents faculty's multiple social identities and includes both sex and race. The faculty of color variable simply indicated that the faculty identified as being non-White, and was aggregated due the small numbers that indicated an identity in an underrepresented racial group. The second block of variables contains characteristics associated with faculty's professional career such academic rank and discipline. With respect to academic rank, the variable was recoded into a set of dichotomous variables, with the reference group being having the rank of a full professor. If not a full professor, participants were an instructor, lecturer, assistant professor, or associate professor.

Blocks three, four, and five control for a number of faculty activities that may divert efforts away from a talent development approach to teaching. For example, prior literature suggests that faculty engaged in more research may subsequently be engaged in less teaching and service (Astin & Chang, 1995; Fairweather, 2002). As such, block three focuses on faculty research activities, including scholarly productivity, importance placed on research, and the number of hours per week faculty engage in research. Block four is comprised of a factor that measures how frequently faculty engage undergraduates in research; this practice not only entails research, but the mentorship and guidance necessary to train students to conduct research (Malachowski, 1996; Shwartz, 2012). Block five centers on a variety of teaching–related activities, such as the number of hours per week spent preparing for teaching, and teaching various course types such as first-year courses, honors courses, and interdisciplinary courses.

Block six is comprised of variables that are related to professional development for teaching. For example, being the recipient of funding and support for teaching may increase a faculty member's ability to infuse new pedagogical techniques and perspectives in the classroom and may ultimately be associated with greater incidences of adopting a student talent development approach to teaching (O'Meara & Braskamp, 2005). Therefore, block seven controls for whether or not the participant received professional development funds for the following activities: attending workshops outside of the institution, integrating technology into the classroom, or for developing new courses. These career development experiences represent different socialization influences intended to incentivize and support good teaching practices.

Block seven contains a variety of classroom pedagogies and course arrangements shown to promote active learning in the STEM education literature (Prince, 2004). The variables included in this block include the frequency by which faculty use student centered pedagogy, supplemental instruction, real-life problems, learn before lecture, and student inquiry in their courses. Many of these approaches serve as an improvement over typical STEM teaching models, and are associated with more positive student outcomes (Allen & Tanner, 2005; Daniel, Lister, Hanna, & Roy, 2007; Prince, 2004; Zappe et al., 2005). Within this block of variables are also the use of practices such as extensive lecturing and grading on a curve, which undermine genuine learning, particularly for women and URM students (Knight & Wood, 2005).

Blocks eight and nine contain institutional characteristics and gauge institutional climate and are indicative of institutional priorities and corresponding reward systems, which shape how faculty are signaled to pursue some tasks over others (O'Meara, 2011). Specifically, block seven includes faculty perceptions of their respective institution's commitment to diversity and efforts to increase prestige. This section also includes whether the institution offers rewards for good teaching, rewards for the use of instructional technology, and perceptions of how accessible faculty are to students outside of regular office hours at the university. Finally, block eight includes the institution's selectivity, control, HBCU designation, size, and type.

Analysis

As missing data may be a source of statistical variation and bias, we used the expectation maximization (EM) algorithm to analyze missing data and impute missing values where appropriate. EM combines maximum likelihood estimation with multiple regression imputation techniques in an iterative process to estimate model parameters. Since EM uses information available in the dataset to produce the imputed values, it is a more advanced method of dealing with missing data than mean replacement (Allison, 2002). After missing data were accounted for, descriptive statistics were run to understand how individual variables were distributed and to examine the simple relationships between variables.

The primary method of analysis employed for this study was hierarchical linear modeling (HLM). HLM was the ideal statistical technique due to the clustered, multi-level nature of our data. This technique separates individual and institutional predictors so that we can investigate how the two types of variables uniquely affect faculty's frequency of adopting a student talent development approach to their teaching. As we were primarily interested in the average effect of predictors on faculty's frequency of using student talent development approaches, we grand-mean centered all continuous variables. Grand mean centering subtracts the mean of the variable from individual observations for the entire sample (Raudenbusch & Bryk, 2002). Dichotomous variables were left un-centered because a zero value on these measures was meaningful. To justify the use of HLM, the outcome variable must vary not only between faculty members within an institution but between faculty at different institutions too. In order to determine between-institution variance, we calculated the intra-class correlation coefficient (ICC) using the fully unconditional model. After running the model, the level-2 variance was .047, indicating that 4.7% of the variance in the outcome variable is attributed to differences across institutions. Yet a majority of the variance was attributable to differences between faculty members within institutions, at 28.2%.

Limitations

It is important to note several limitations when interpreting the findings of this study. First, the analysis is limited by the use of secondary data analysis, limiting the analysis to the variables and their definitions within the 2013-2014 faculty survey. Additionally, the survey was not designed from a cycle of socialization perspective. As such, the survey does not ask many questions regarding their graduate training, which is an important consideration when trying to understand the mechanisms that socialize faculty to adopt a student talent development approach to teaching. Secondly, the cross-sectional nature of the data prevents us from inferring temporal causality. Thus, activities highly related to the outcome cannot be determined to definitively immediately precede or cause the outcome. Lastly, no weights were utilized in these analyses, since many higher education institutions do not systematically collect data on part-time faculty which makes it more difficult to determine representativeness within an institution.

Results

Regression Analyses

Several predictors were significantly associated with adopting a student talent development approach. In regard to personal identity, there were no significant differences by gender and race in adopting a student talent development approach to teaching. Although gender was a significant and positive predictor in blocks one through six (β=.66, p=.005), it became insignificant once classroom pedagogies were controlled for in block seven (β=0.17, p=.438). Otherwise stated, although women more frequently engage in a talent development approach compared to men, gender is associated with differences in classroom-teaching practices which explains the variance talent development. In regards to professional characteristics, instructors (β=2.10, p=.000) and lecturers (β=1.83, p=.002) more frequently employed a student talent development approach to teaching compared to full professors. Further, there were no differences when comparing associate professors and assistant professors to full professors in the frequency of adopting a student talent development approach. In addition to faculty rank, several disciplinary differences were also observed. Results indicate that faculty members from life sciences ($\beta=-1.80$, $p=.000$), health sciences ($\beta=-2.13$, $p=.000$), and engineering disciplines ($\beta=-1.20$, $p=.003$) engage in significantly less talent development than their peers in the physical sciences.

There are several noteworthy findings regarding the research and teaching practices of faculty. First, faculty with a higher score on scholarly productivity no more frequently used student talent development practices in their classrooms compared to those who were less productive in terms of research outputs ($p=.095$). Further, importance placed on research and hours per week spent on research and scholarly writing were also insignificant predictors of frequency of engaging in the talent development of students, which is in alignment with recent research by Figueroa and colleagues (2016). Yet engaging undergraduate students in undergraduate research was a significant predictor, with faculty who more frequently engaged undergraduate students in their research projects more likely to integrate talent development practices into their classroom teaching ($b=.07$, $p=.000$). With respect to teaching, faculty who taught an honors course ($b=.67$, $p=.019$) or a first-year seminar course ($b=.68$, $p=.011$) more frequently adopted a student talent development approach compared to those who had not. Faculty who spent more hours advising and counseling students ($b=.39$, $p=.002$) and preparing for teaching ($b=.43$, $p=.000$) also more frequently engaged in a talent development approach to teaching in the classroom. Faculty who mentored undergraduate students to a greater extent also engaged in greater amounts of student talent development ($b=3.61$, $p=.000$).

Professional development items captured by the faculty survey have little impact on how frequently faculty members engage in a student talent development in their teaching. Only one of the three professional development variables – incentives to integrate new technology into your classroom – was significantly related to the outcome (b=.57, p=.022). Faculty who received such incentives (versus those who did not) more frequently employed a student talent development approach in the classroom compared to those who did not receive them. In contrast, attending paid workshops outside of the institution focused on teaching and incentives to develop new courses were both statistically unrelated to outcome talent development approach.

A number of classroom practices and pedagogies were significant in predicting the frequency by which faculty employ student talent development strategies in the classroom. Notably the highest simple correlation between the variables in this block and the dependent variable was .35 and this was for the student-centered pedagogy construct. Therefore, the independent variables are independent measures that meet the standard for regression analysis Student-centered pedagogy was positively and significantly related to the outcome (b=.17, p=000), meaning that faculty who engaged in this practice more also more frequently developed student's academic talents in the classroom. Other classroom approaches such as using real-life problems (b=.40, p=.006, using student inquiry to drive learning (b=1.28, p=.000), learn before lecture through multimedia tools (b=.47, p=.000), and supplemental instruction that is outside of class and office hours (b=.25, p=.049) were also positively and significantly associated with the outcome variable. Faculty who more often engaged in these practices also more frequently employed student talent development approaches in the classroom. Collectively, these variables were not only the most significant, but made several variables insignificant once accounted for in the model. As previously noted, gender became both insignificant when methods were introduced into the model, closing the gender gap with respect to frequency of adopting a student talent development approach. Additionally, the difference between associate professors and full professors in the outcome variable became non-significant once teaching practices and pedagogies were controlled.

Concerning institutional climate and characteristics, several variables were significantly related to the outcome. Faculty who reported being more interested in the academic problems of undergraduate students more frequently engaged in student talent development practices (b=.36, p=.05). At the institutional level faculty at public institutions more frequently engaged in student talent development approaches in the classroom compared to faculty at private institutions (b=-1.02, p=.003). Finally, faculty at research universities were less likely than those at Masters comprehensive institutions to implement student talent development practices in their teaching (b=-.90, p=.045).

Discussion

This study seeks to better understand the factors that contribute to the adoption of a student talent development approach to teaching in STEM classrooms. Guided by literature on faculty and Harro's (2000) Cycle of Socialization, we identified and empirically tested variables that likely contributed to the frequency with which STEM faculty engaged in this important practice. Of all the variables tested, the single most powerful predictor of the frequency with which STEM faculty use a talent development approach in the classroom is the extent to which faculty reported mentoring undergraduates. Other studies reveal that mentoring activities allow faculty to gain a more personal relationship with students and a more intimate understanding of the unique challenges students encounter (Fries-Britt & Snyder, 2015). Perhaps during these mentoring conversations, students share with faculty their learning struggles in other classes and faculty reflect on whether these same issues exist in the classes they teach. Research already demonstrates that benefits from mentoring relationships do not only flow from faculty to students (Griffin, 2012); perhaps ideas for how to improve teaching are one type of benefit for faculty. Another important finding is that faculty members who more frequently use student-centered pedagogy within their class also more frequently use a student talent development approach while teaching. This finding is not surprising, as previous research already shows that pedagogy that enable students to be active in the construction of knowledge contributes to a wealth of benefits for students compared to faculty-centered practices (Freeman et al., 2007; McDaniel et al., 2007; Prince, 2004).

We also found that faculty's use of student inquiry to drive learning was significantly associated with talent development practices in the classroom. Considering the individual items that comprise the talent development construct this finding seems logical. If faculty members want students to 'take risks for potential gains' and 'ask questions in class,' than an effective way to meaningfully learn science and achieve these objectives is to provide students with the opportunity to investigate the questions that interests them most. The next most significant finding was that more hours per week faculty spend preparing for teaching was associated with a greater frequency of taking talent development approaches in the classroom. It is unclear, however, whether a commitment to thoughtful planning of course lessons contributes to talent development classroom approaches per se or whether faculty spend more time planning courses when they are required to teach a greater number of classes. In the case of the latter explanation, the interpretation of this finding is that faculty who teach more classes are more likely to use talent development approaches in their classes. Nonetheless, it is likely that teaching in a manner that develops students' talents is a craft that is used more frequently with practice and planning.

From our analysis, it is also clear that faculty in some disciplines more frequently take a talent development approach than others. Specifically faculty in the health science & life science seem to practice talent development techniques less often that faculty in the physical sciences. This was surprising, as mathematics classrooms have been critiqued for their lack of engaging classroom pedagogy. Yet a closer look into the physical science construct reveals that it also contains astronomy, physics, and chemistry disciplines. For example, physics as a discipline has been a leader in pioneering discipline-based education research (DBER) (Redish, 2000). We also find that using a “learn before lecture” technique through multimedia tools (e.g. flipping the classroom) in a greater proportion of the classes that one teaches was associated with more frequent use of talent development in the classroom. This may be because teaching a flipped class effectively requires a significant amount of investment; indeed, faculty members choosing to teach a flipped class are usually very committed to improving their teaching craft and place a great importance on student learning.

An encouraging finding is that traditional measures of scholarly productivity such as research output and importance placed on research are not significantly related to a student talent development approach. This is encouraging because it shows that STEM faculty can be productive researchers *and* give students the attention they need in class to help students develop the skills needed to become more scientifically talented. Also encouraging is the finding that faculty who conduct research with undergraduate students more frequently engage in student talent development practices in the classroom. Training undergraduate students how to conduct meaningful research requires additional time, patience, and high-touch mentoring (Schwartz, 2012). Faculty who work with students in the lab may recognize how to effectively maintain student engagement and interest in STEM and what works best to help students grow as scientists, and may decide to infuse those practices into the classroom. The finding that engaging students in research makes talent development more highly used in the STEM classroom provides additional evidence for the synergy that can occur between productive research and engaged teaching (Figueroa et al., 2016). This finding also provides evidence of the value of having additional "face time" with students in setting out of the classroom, which may give faculty a more intimate insight into the broad array of talents that students have that can be used to advance the scientific enterprise. Moreover, "face time" appears to be an important factor for cultivating student talent in the classroom given the finding that faculty who teach a first-year seminar course or an honors course more frequently develop student talent than those who do not teach such classes. These course formats are generally more intimate and smaller than standard lecture courses (Davis, 1992; Tsui, 1999); increased personal contact with students and familiarity of their strengths may encourage faculty to try new approaches that add value to students' learning.

Faculty rank is also an important characteristic associated with a student talent development to teaching. STEM lecturers and instructors more frequently employ student talent development pedagogies compared to full professors, even after controlling for research outputs. These findings indicate that non-tenure track faculty members may be providing an additional and understudied contribution to student learning in the classroom that full professors are not. This finding is especially interesting considering the fewer institutional resources and supports to which non-tenure track faculty typically have access at 4-year colleges and universities (Hoeller, 2014).

With respect to aspects of the institutional climate that are conducive to faculty taking a talent development approach to teaching, only one variable is statistically significant.

Institutional culture may be the reason why we find that faculty more often use talent development in the classroom when they perceive that other faculty at their respective institutions are interested in the academic problems of undergraduate students. Indeed in an environment where all faculty are committed to student success and expected to develop the talents of students, engaging in innovative teaching is merely a norm and not a practice in need of justification; perhaps faculty at these institutional also receive greater support to improve their teaching.

At the institutional level, faculty members at research institutions engage in talent development much less often that those at Masters comprehensive institutions. This finding may make sense when considering that research universities enroll a greater proportion of highly selective students (Griffin & Hurtado, 2010); therefore, the teaching practices faculty employ reflect that they expect their students to be self-directed learners. Faculty at research institutions may also feel less inclined to develop the talents of students of different ability levels. Further, there tends to be a greater expectation for engaged teaching at masters institutions (Baldwin, 1990), which may promote faculty interest in talent development. The decreased preponderance of talent development pedagogy at research institutions may explain why students attending research institutions are 7.6% less likely to complete a STEM degree in four years compared to students at master's comprehensive institutions (Hurtado, Eagan, & Hughes, 2012). In short, research institutions have lessons to learn from faculty at masters comprehensive institutions. Fortunately, researchers are already examining the aspects of institutional cultures at different institutional types that promote STEM teaching and learning (Wilkins et al., 2016), since organizational culture affects how faculty members teach in the classroom (Umbach & Wawrzynski, 2005).

Implications and Conclusion

A student talent development approach to teaching is essential for faculty to utilize in STEM classrooms if institutions are to increase the number of students from a broad range of educational backgrounds reach STEM degree completion. Since talent development practices seek to assess student's current capabilities and then contribute to students' intellectual and scholarly growth (Astin & antonio, 2012), this study sought to better understand the factors associated with the frequency that STEM faculty adopted such approaches to teaching within the classroom.

Our findings suggest that when faculty members have increased exposure to students in settings other than the traditional classroom arrangement – such as via mentoring, supplemental instruction, undergraduate research, and first-year seminar courses – they are more closely associated with practices that develop students' talents. This finding supports greater investment in these interventions at the institutional level. Encouraging more faculty members to be involved in such interventions will likely help faculty view students as more than just a grade, but as a person with goals, challenges, and aspirations. Although department chairs and deans should encourage their faculty to participate in talent development practices, faculty experience very real constraints and infringements on their time. Therefore, leaders should start by encouraging faulty to implement "low-hanging fruit" practices such as using student inquiry in the classroom. Faculty who then master these practices can then move on to more complex strategies. Since some practices require faculty to invest more time and resources such as designing courses or engaging in different classroom settings, institutions should structure reward systems that better incentivize the implementation of these practices (O'Meara & Rice, 2005) and provide the necessary support so that faculty can gain real practice using these strategies. Perhaps sharing with faculty empirical data that demonstrates the greater academic gains that result from talent development teaching practices (Henson, 2003) and the range of investment from low to high in implementing various approaches will make it more likely that they may use them. Indeed, students in the sciences deserve to learn in classroom settings that demystify the learning process, normalize mistakes, and allow them to showcase both traditional and non-traditional forms of scientific talent.

Like other survey research, this study raises more questions than answers. For example, although professional development is touted as an essential for incentivizing faculty change (O'Meara & Braskamp, 2005), only one of the professional development variables in our analysis were significant in predicting use of talent development techniques in the classroom. Future research can investigate via qualitative inquiry which professional development techniques seem to work in changing faculty behavior, how they are implemented, and under which contexts they are successful. And of the faculty already effectively using talent development approaches in their STEM classrooms, researchers should also investigate the reasons faculty give for utilizing this approach to teaching.

Future research should also consider a wider array of campus structures and supports to encourage faculty to engage in student talent development practices in the classroom. Since faculty members already experience a number of different tensions and infringements on their time (Link, Swan, & Bozeman, 2008), it is important that policies support faculty in implementing a student talent development approach. While the effects of tenure and promotion guidelines on faculty teaching is well documented (Fairweather & Rhoads, 1995; O'Meara & Braskamp, 2005), future work may consider the effects of other understudied areas; for example, does having access to a faculty STEM peer networks empower more faculty to take on a talent development approach to teaching if the network is primarily concerned with learning and implementing findings from discipline based education research? Investigating understudied areas of faculty life and their effects on student talent development will be important in collective efforts to improve teaching and learning in STEM, which will help institutions across the nation produce graduates who enter the STEM workforce and make positive contributions to technological and scientific advancement.

Table 3: Results of hierarchical model predicting student talent development approach

	Variables	r	b	SE	Sig. level
		Final Model			
	Level 1				
1	Demographic Characteristics				
	Sex (Female)	0.07	.15	.21	
	Faculty of Color	-0.01	.10	.36	
2	Faculty Characteristics				
	Associate Professor (Reference: Full Professor)	0.01	.02	.26	
	Assistant Professor (References: Full Professor)	0.05	.34	.22	
	Instructor (Reference: Full Professor)	0.03	2.10	.56	***
	Lecturer (References: Full Professor)	0.02	1.83	.59	**
	Life Sciences (Reference: Physical Sciences)	-0.00	-1.80	.31	***
	Engineering & Computer Science (Reference: Physical Sciences)	-0.02	-1.20	.40	**
	Health Sciences (References: Physical Sciences)	-0.01	-2.13	.37	***
3	Research Activities				
	Scholarly Productivity	-0.08	-.13	.02	
	Importance: Research	-0.12	-.03	1.33	
	Hours per week: Research & Scholarly Writing	-0.05	.10	.08	
4	Research Activities with Undergraduate Students				
	Research with undergraduate students	0.19	.07	.02	***
5	Teaching Activities				
	Taught an honors course	0.09	.67	.30	*
	Taught an interdisciplinary course	0.10	.08	.21	
	Taught a seminar for first-year students	0.11	.68	.27	*
	Hours per week: Preparing for teaching	0.21	.43	.07	***
	Hours per week: Advising and counseling students	0.15	.39	.13	**
	Hours per week: Committee work and meetings	0.17	-.03	.13	
	Mentor undergraduate students	0.39	3.60	.29	***
	Importance: Teaching	0.23	1.40	.36	***
	Importance: Service	0.07	-.22	.16	
6	Professional Development				
	Paid workshops outside of the institution focused on teaching	0.11	.14	.25	
	Incentives to develop new courses	0.11	-.36	.35	
	Incentives to integrate new technology into your classroom	0.11	.57	.25	*

Table 3: Results of hierarchical model predicting student talent development approach

	Final Model			
Variables	r	b	SE	Sig. level
7 Teaching Practices				
Extensive lecturing	0.00	-.09	.15	
Using real-life problems	0.23	.40	.14	**
Using student inquiry to drive learning	0.32	1.28	.16	***
"Learn before lecture" through multimedia tools (e.g. flipping the classroom)	0.18	.47	.12	***
Supplemental instruction that it outside of class and office hours	0.21	.25	.12	*
Grading on a curve	0.00	.08	.09	
Student Centered Pedagogy	0.35	.17	.02	***
8 Institutional Climate				
Faculty are interested in students' personal problems	0.09	-.28	.17	
Faculty here are strongly interested in the academic problems of undergraduates	0.12	.36	.18	*
It is easy for students to see faculty outside of regular office hours	0.10	.29	.21	
Faculty are rewarded for being good teachers	0.01	-.10	.15	
Institutional Priority: Increasing Prestige	0.02	.02	.01	
Institutional Priority: Diversity	0.08	.01	.01	
9 Level 2: Institutional Characteristics				
Selectivity		-.00	.01	
Control (Public vs. Private)		-1.02	.34	**
HBCU (vs. non-HBCU)		1.70	1.07	
Institutional Size		.25	.31	
FTE (per 1,000)		.01	.81	
Undergraduate Enrollment (per 1,000)		.55	.98	
Baccalaureate (Reference group: Masters)		-.30	.41	
Research (Reference group: Masters)		-.88	.44	*
% Level-1 variance explained			28.2%	
% Level-2 variance explained			80.6%	

p<.05*
p<.01**
p<.001***

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Appendix A: Coding Scheme for Variables

Variables and Coding

Variable	Coding Scheme
Dependent variable	
Student Talent Development Approach	Factor
Block 1: Demographic Characteristics	
Sex (Female)	1 = Male, 2 = Female
Faculty of Color	1 = No, 2 = Yes
Block 2: Faculty Characteristics	
Professor (Reference)	1 = No, 2 = Yes
Associate Professor	1 = No, 2 = Yes
Assistant Professor	1 = No, 2 = Yes
Lecturer	1 = No, 2 = Yes
Instructor	1 = No, 2 = Yes
Life Sciences (Reference)	1 = No, 2 = Yes
Engineering & Computer Science	1 = No, 2 = Yes
Health Sciences	1 = No, 2 = Yes
Physical Sciences	1 = No, 2 = Yes
Mathematics & Statistics	1 = No, 2 = Yes
Block 3: Research Activities	
Scholarly productivity	Factor
Importance: Research	1 = Not important, 4 = Essential
Hours per week: Research and scholarly writing	1 = None, 7 = 21+
Block 4: Research with undergraduate students	
Faculty research with undergraduates	Factor
Block 5: Teaching Activities	
Taught an honors course	1 = No, 2 = Yes
Taught an interdisciplinary course	1 = No, 2 = Yes
Taught a seminar for first-year students	1 = No, 2 = Yes
Importance: Teaching	1 = Not important, 4 = Essential
Hours per week: Preparing for teaching (including reading student papers and grading)	1 = None, 7 = 21+
Hours per week: Advising and counseling students	1 = None, 7 = 21+
Hours per week: Committee work and meetings	1 = None, 7 = 21+
Mentor undergraduate students	1 = Not at all, 3 = To a great extent
Importance: Teaching	1 = Not important, 4 = Essential
Importance: Service	1 = Not important, 4 = Essential
Block 6: Professional Development	
Prof Develop: Paid workshops outside the institution focused on teaching	1 = No, 2 = Yes
Prof Develop: Incentives to develop	1 = No, 2 = Yes

new courses	
Prof Develop: Incentives to integrate new technology into your classroom	1 = No, 2 = Yes
Block 7: Classroom Practices	
Extensive lecturing	1 = None, 4 = All
Using real-life problems	1 = None, 4 = All
Using student inquiry to drive learning	1 = None, 4 = All
Method: “Learn before lecture” through multimedia tools (e.g., flipping the classroom)	1 = None, 4 = All
Supplemental instruction that is outside of class and office hours	1 = None, 4 = All
Method: Grading on a curve	1 = None, 4 = All
Student Centered Pedagogy	Factor
Block 8: Institutional Climate	
Faculty are interested in students’ personal problems	1 = Disagree strongly, 4 = Agree strongly
Faculty here are strongly interested in the academic problems of undergraduates	1 = Disagree strongly, 4 = Agree strongly
It is easy for students to see faculty outside of regular office hours	1 = Not descriptive, 3 = Very descriptive
Faculty are rewarded for being good teachers	1 = Not descriptive, 3 = Very descriptive
Institutional Priority: Increasing Prestige	Factor
Institutional Priority: Diversity	Factor
Block 9: Institutional Characteristics	
Selectivity	9 = Highly selective
Control	1 = Public, 2 = Private
HBCU	0 = No, 1 = Yes
Institutional Size	1 = Under 1,000, 5 = 20,000 and above
FTE (per 1,000)	
Undergraduate Enrollment (per 1,000)	
Baccalaureate	1 = No, 2 = Yes
Masters (Reference)	1 = No, 2 = Yes
Research	1 = No, 2 = Yes

Appendix B: Independent Variable Factors

Scale & Items

Research with undergraduate students	**Factor Loading**
	α = .752
Engaged undergraduates on your research project*	0.795
Presented with undergraduate students at conferences**	0.723
Worked with undergraduates on a research project*	0.706
Published with undergraduates**	0.659

*During the past two years, have you engaged in any of the following activities?
1=No, 2=Yes
**In the past two years, to what extent have you:
1=Not at all, 2=To some extent, 3=To a great extent

Student Centered Pedagogy	**Factor Loading**
	α = .823
Student Presentations	0.741
Group Projects	0.704
Cooperative learning (small groups)	0.642
Student evaluations of each others' work	0.640
Class Discussions	0.596
Student-selected topics for course content	0.541
Reflective writing/journaling	0.504
Experiential learning/Field studies	0.494

In how many of the courses that you teach do you use each of the following?
1=None, 2=Some, 3=Most, 4=All

Scholarly Productivity	**Factor Loading**
	α = .779
Articles in academic or professional journals*	0.869
In the past two years, how many of your professional writings have been published or accepted for publication?**	0.754
Chapters in edited volumes*	0.669

*How many of the following have you published?
1=None, 2=1-2, 3=3-4, 4=5-10, 5=11-20, 6=21-50, 7=51+
**In the past two years, how many of your professional writings have been published or accepted for publication?
1=None, 2=1-2, 3=3-4, 4=5-10, 5=11-20, 6=21+

Institutional Priority for Increasing Prestige	Factor Loading
	α = .752
Enhance the institution's national image	0.897
Increase or maintain institutional prestige	0.822
Hire faculty "stars"	0.463

Indicate how important you believe each priority listed below is to your college or university
1=Low priority, 2=Medium priority, 3=High priority, 4=Highest priority

Institutional Priority for Diversity	Factor Loading
	α = .853
Promote racial and ethnic diversity in the faculty and administration	0.912
Promote gender diversity in the faculty and administration	0.817
Develop an appreciation for multiculturalism	0.718
Recruit more minority students	0.635

Indicate how important you believe each priority listed below is to your college or university
1=Low priority, 2=Medium priority, 3=High priority, 4=Highest priority