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College Instructors' Implicit Theories About Teaching Skills and Their Relationship to Professional Development Choices

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Implicit theories about the malleability of skills/abilities have been shown to predict learners' willingness to participate in learning opportunities. The authors examined whether college professors' implicit theories about the malleability of teaching skills predicted their willingness to engage in professional development (PD) related to teaching. One hundred thirty faculty members completed a questionnaire measuring implicit theories about teaching skills and interest in several PD opportunities. Implicit theory of teaching scores predicted faculty members' interest in PD and their PD choices. The findings have implications for colleges/universities, which face increased pressure to engage faculty in PD in order to meet goals for institutional excellence.

The demands of teaching on college and university campuses have changed in the last quarter century. Trends that faculty members in higher education face include an increasingly diverse student body (KewalRamani, Gilbertson, Fox, & Provasnik, 2007), the availability of new technologies for teaching and learning, greater emphasis on assessment that is aligned with learning goals and pedagogies (Fink, 2003), and a movement toward connecting theory and practice in undergraduate education through experiential learning (Freeland, 2009). In addition, the view of teaching as the private domain of individual faculty members is shifting. For instance, Lee Shulman, one of the most influential voices in

educational psychology, called for teaching on college campuses to become "community property," to be valued, documented, and evaluated in the same way as scholarly research (Shulman, 2004). Since then, others too have called for college faculty to "go public" with their teaching for the purpose of improvement or evaluation (Huber & Hutchings, 2005).

In this challenging landscape, professional development (PD) has become critically important (Sorcinelli, Austin, Eddy, & Beach, 2005), providing faculty members with a means to acquire new teaching skills or improve existing ones. Despite the availability of many PD opportunities, however, one of the authors, who heads a Center for Teaching Excellence, has observed that while some faculty members choose to avail themselves of PD opportunities, many do not. Anecdotal evidence from collaborations with other such Centers suggests that this trend is not uncommon. The study presented here seeks to explore this difference among faculty members. Our work is based on the growing recognition in PD research (which is most extensive in the area of K-12 education) that PD places teachers in the role of learners (Darling-Hammond, 1998; Loucks-Horsley & Matsumoto, 1999). Placed in this position, teachers' (or, in this case, faculty members') reactions to PD may be shaped by the same variables that influence their students' reactions to learning events. One psychological variable that has been found to influence learners' cognitions and behaviors has to do with their implicit theories about the extent to which skills/abilities are either relatively unchangeable or capable of being developed through effort and experience (Dweck, Chiu, & Hong, 1995). This study examined whether a related psychological variable—faculty members' beliefs about the malleability of *teaching* skills—predicted their interest in participating in PD and/or the types of PD they were likely to select.

Implicit Theories About How Abilities and Skills Affect Learning Goals and Behaviors

Psychological research has documented that individuals differ in the extent to which they view personal traits -- for example, intelligence, personality, morality, shyness, and physical skills -- as malleable (Beer, 2002; Dweck et al., 1995; Hong, Chiu, Dweck, Lin, & Wan, 1999; Ommundsen, 2003). People's beliefs about traits, which the research literature refers to as "implicit theories," fall into two camps: the view that these qualities are largely fixed and unchangeable (entity theory) and the view that people can improve in these areas through effort, practice, or training (incremental theory).

Research has shown that individuals' beliefs about their skills or abili-

ties (for example, their intelligence or physical aptitude) have widespread impact on both cognitive and behavioral outcomes related to learning. For example, in the area of implicit theories about intelligence, students who view intelligence as relatively stable and unchangeable, that is, those who are entity theorists, are more likely than their incremental-theorist counterparts to attribute poor academic performance to low ability rather than to factors over which they may have more control, such as inadequate effort (see Dweck et al., 1995, for a review of the research findings in this and related research). Students who are entity theorists also generate *performance* goals: goals that are focused on appearing intelligent (or at least not appearing *un*intelligent). Such goals stand in contrast to *learning* goals, which are focused on increasing one's skills, even at the risk of performing poorly. Moreover, entity theorists are more likely to manifest helpless learning behaviors, for example, giving up instead of persevering when they encounter academic difficulties. Similar findings have been documented in studies of implicit theories about athletic abilities (Kasimatis, Miller, & Marcussen, 1996; Ommundsen, 2003) and business-related decision-making (Wood & Bandura, 1989; see also Tabernero and Wood, 1999). These studies manipulated students' theories about athletic abilities and managerial skills, respectively, and found that learners' cognitions and/or performance were adversely affected when they held entity theories.

Individual differences in implicit theories are predictive of the choices that people make with regard to learning opportunities that could potentially improve their skills. Specifically, implicit theories influence both people's willingness to take advantage of learning opportunities and the types of learning opportunities that they choose. For instance, in a study by Hong et al. (1999), college freshmen at a Hong Kong University were more willing to take a remedial course to improve their English-language skills when they held incremental theories of intelligence than when they held entity theories. In a related study, college students' theories of intelligence were manipulated by providing them with articles espousing either the entity or incremental perspectives (Hong et al., 1999). When entity-condition students believed that they had performed below average on an assessment of intelligence, they were less likely than their incremental-condition counterparts to take a course that would improve their performance on a subsequent test. Entity-condition students also reported a preference for easy tasks over difficult tasks. Likewise, in Kasimatis et al.'s (1996) study of athletics, when participants were presented with an easy exercise program, there were no differences between entity and incremental conditions in willingness to use the program in the future.

But when faced with a challenging exercise program, those with entity theories of athletic skills reported less willingness to do so. Based on such findings, Dweck (2000) has argued that entity theorists are especially likely to avoid tasks that expose their weaknesses to others.

The range of domains (for instance, shyness, relationships) in which the effects of implicit theories have been documented suggests that the phenomenon is widespread and robust; however, this research has been conducted primarily with students. To our knowledge, there are no empirical investigations of college faculty members' (or, for that matter, any group of teachers') beliefs about the malleability of teaching skills and the relationship between those beliefs and PD preferences. This research gap exists despite the recognition that individuals in the U.S. sometimes perceive teaching as a natural talent ("teachers are born and not made") as opposed to a learned skill (Darling-Hammond & Ball, 1998) and despite the widespread acknowledgment that teachers' beliefs play a role in their interactions with and resulting benefits from PD (Darling-Hammond & Ball, 1998; Loucks-Horsley & Matsumoto, 1999; Richardson, 2003; Spillane, Reiser, & Reimer, 2002). In addition, entity theorists' avoidance of tasks that potentially could expose their weaknesses may particularly clash with current trends in teacher professional development. PD opportunities recommended by educational-reform researchers increasingly place teaching practices under scrutiny by instructors themselves and by others so that those practices can be studied, understood, and modified (Darling-Hammond, 1998; Hiebert & Stigler, 2000; Joyce & Showers, 2002; Loucks-Horsley & Matsumoto, 1999; Richardson, 2003; Saunders & Goldenberg, 2005; these recommendations are reviewed briefly below, in Method). Given these trends, implicit theories have potentially important implications for college faculty members, who have traditionally had a great deal of autonomy with regard to PD choices. That is, those with entity views of teaching may be less interested in availing themselves of PD in general; additionally, they may particularly avoid learning events that place their teaching practices under close scrutiny by others because such events could result in negative evaluations of their teaching skills.

Overview of the Study

The purpose of this study was to examine whether college faculty members' implicit theories of teaching (ITT) skills predicted (a) their interest in PD opportunities and (b) the types of PD they were likely to choose. Faculty members at a private university in Southern California completed a questionnaire that assessed their implicit theories about teaching and

their interest in a variety of PD opportunities. Faculty members rated their level of interest in each PD opportunity and, in addition, selected up to five opportunities in which they would be most interested. Two additional variables were also assessed: faculty members' implicit theories of intelligence (ITI) and their beliefs about students' learning needs (that is, did they believe that student learning, in their department or program, needed to improve in a variety of ways?). The ITI questionnaire items have been validated and studied extensively in student samples (Dweck et al., 1995; Hong et al., 1999). They were included to examine the validity of the ITT measure. The beliefs-about-student-learning-needs items were included because such beliefs may moderate faculty members' willingness to participate in PD; that is, those who do not view learning as needing to change may see little reason to take part in PD. Both variables served as covariates in our analyses.

We proposed the following three hypotheses:

1. Entity endorsements of teaching skills would be associated with lower ratings of interest in PD opportunities. They would also be associated with a fewer number of PD opportunities selected.

2. Entity endorsements would be associated with less interest in three a priori-selected PD opportunities that involved high scrutiny of faculty members' own teaching.

3. Entity endorsements would be associated with a preference for more "normative" PD choices (that is, PD opportunities that were selected by higher proportions of the sample). This final hypothesis followed the reasoning that, if asked to choose, entity theorists might feel pressure to report interest in some form of PD, but such forced choices would likely reflect institutional or job-related standards rather than individual interests. In contrast, incremental theorists might be more likely to freely choose PD opportunities based on personal preferences or curiosities and, thereby, deviate somewhat more from these norms. By this rationale, entity theorists would be expected to make more normative choices for PD than their incremental-theorist counterparts.

Methods

Participants

The initial study sample included 143 faculty members from a mid-sized private university in Southern California. Participation was voluntary. Volunteers were recruited through an e-mail sent to all faculty members at the university. No incentives were provided for participating. Thirteen of the initial participants did not complete large portions of the questionnaire and were, therefore, deleted from analyses. This resulted in a final sample of 130 faculty members. (Sample sizes vary slightly across analyses because a few individuals in the final sample did not respond to some items on the questionnaire.) The participants were largely (91%) tenured or tenure track professors with teaching experience ranging from 0 to over 16 years. They represented a variety of departments across all six colleges/schools in the university: liberal arts, science and engineering, business, education, communication/fine arts, and film/TV. Age and gender data were not collected because such data might have served to identify professors from smaller-sized departments.

Design and Procedure

We administered a questionnaire to participants online that included measures of faculty members' beliefs about students' learning needs, their implicit theories about teaching (ITT), their interest in various professional development opportunities, and their implicit theories about intelligence (ITI) (adapted from Dweck et al., 1995, and Dweck, 2000). In addition, information was collected about faculty members' school/college and departmental affiliations, years teaching, and position (tenure/tenure track or non-tenure track; part-time or full-time).

Beliefs About Students' Learning Needs

Faculty members rated on a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*) the extent to which, in their department or program, students' abilities needed to improve in the following five areas: content learning, critical thinking, monitoring learning, intrinsic motivation, and ability to think about problems encountered outside of their discipline or classroom ($\alpha = .85$). These items were included to serve as a covariate for many of the analyses reported below. Again, the rationale was that if faculty members did not perceive a need for improving student outcomes, they might not view improving their teaching practices as important.

Implicit Theories About Teaching Skills

Three items assessing beliefs about teaching were developed, using Dweck et al.'s (1995) intelligence items as a model. These items were as follows: (a) "You can't really teach someone how to be a great teacher; great teachers are born, not made"; (b) "An instructor can learn some new teaching skills, but you can't really change how well he/she helps students understand topics or gets students to think critically"; and (c) "Someone's teaching may improve a little with training and experience, but it can't be hugely improved" (α = .86). These items were rated on a 6-point Likert scale from 1 (*strongly agree*) to 6 (*strongly disagree*), with low scores indicating entity perspectives.

Interest in PD Opportunities

A list of 15 PD opportunities (shown in Table 1) was provided to participants. These opportunities were selected based on the best-practice literature on teacher PD (Darling-Hammond, 1998; Hiebert & Stigler, 2000; Joyce & Showers, 2002; Loucks-Horsley & Matsumoto, 1999; Richardson, 2003; Saunders & Goldenberg, 2005). There is consensus in this area that training workshops, traditionally a popular means of providing teachers with PD, are not, by themselves, sufficient for appreciably improving teaching and learning. Though workshops may be one source of PD, additional recommended practices include the following: providing coaching or mentoring for teachers; providing opportunities to observe and be observed by other teachers; contextualizing PD in relevant contexts, most notably in teachers' classrooms, grappling with their students' work, and focused on their own goals for students' learning; providing opportunities for collaboration among teachers; and helping teachers to base instructional decisions on student data and performance. Thus, PD items on the questionnaire spanned this wide range of activities.

Participants first rated on a 5-point scale from 1 (*not interested*) to 5 (*very interested*) how interested they would be in availing themselves of each PD opportunity if they had access to it (α = .90). After rating their interest in each PD opportunity, participants were instructed to select up to five opportunities on the list in which they would be most interested. This additional measure was included because Dweck (2000) has argued that differences in task choice are more likely to emerge when potentially threatening and potentially neutral tasks are "pitted against each other" (p. 27).

Three of the PD opportunities included on the measure involved close scrutiny of one's own teaching practices. These items—"have a

Table 1
**PD Opportunity Items and the Proportion
of the Sample That Selected Each**

Item No.	Item	Proportion of Sample Selecting
1	Collaborate with my colleagues to develop strategies for improving our teaching.	.45
2	Discuss with my colleagues how the curriculum can be changed to deepen students' understandi of course content.	.44
3	Take a class/workshop that allows me to explor some topic relevant to my course.	.41
4	Have a colleague, mentor, or teaching consultan observe my class and provide feedback.	.33
5	Take a class/workshop about alternative approaches to teaching.	.31
6	Take a class/workshop about the latest research teaching and learning.	.28
7	Watch one of my colleagues as he/she teaches a lesson.	.27
8	Take a class/workshop on a new procedure or software that I can use for one of my courses.	.25
9	Read and discuss research on teaching and learr with my colleagues.	.24
10	Take a class/workshop on how to integrate technology into my teaching.	.23
11	Ask a colleague or teaching consultant for advice about alternative approaches to teaching a topic that I cover.	.21
12	Have a teaching consultant videotape my teaching so we can watch and discuss the taped lesson.	.18
13	Examine samples of my students' work with my colleagues, to better understand what skills my students are (are not) grasping.	.17

Table 1
**PD Opportunity Items and the Proportion
of the Sample That Selected Each (*continued*)**

Item No.	*Item*	*Proportion of Sample Selecting*
14	Take a class/workshop about new assessment strategies.	.16
15	Discuss my learning assessments with my colleagues, to find better ways of assessing students' mastery of course material.	.15

colleague, mentor, or teaching consultant observe my class and provide feedback"; "have a teaching consultant videotape my teaching so we can watch and discuss the taped lesson"; and "examine samples of my students' work with my colleagues, to better understand what skills my students are (are not) grasping"—also followed best-practice trends. We hypothesized *a priori* that these opportunities would be particularly unappealing to those with entity theories of teaching, as they would be most likely to invite negative judgments of one's skills by others (Dweck, 2000).

Implicit Theories of Intelligence

Three items, developed by Dweck and colleagues (Dweck 2000; Dweck et al., 1995), served to assess implicit theories of intelligence ($\alpha = .98$). This measure, which has been extensively validated (Dweck et al., 1995), was used to examine the validity of the ITT measure in two ways: First, multiple group confirmatory factor analyses assessed whether the ITT and ITI items formed two independent constructs invariantly across different faculty groups; second, the ITI items served as a covariate in many of our analyses. Both techniques can be used to establish the discriminant validity of measures. Dweck (2000) has distinguished between items targeted at measuring beliefs about the self (worded as, "You have a certain amount of intelligence, and you can't really do much to change it") and those that measure beliefs about others (worded as "People have a certain amount of intelligence, and they can't really do much to change it"). The latter version was used for theories of intelligence items on this questionnaire.

Results

We first present statistical analyses used to validate the ITT measure. These were important because this study is the first to use this measure. Validation analyses are followed by findings that addressed the study's main research questions.

Validation of the Implicit Theory of Teaching Measure

The average rating across the three ITT items was 4.55 ($SD = 1.03$) and across the ITI items was 4.14 ($SD = 1.37$). On the ITT items, 9% of participants had average ratings of 3 or below, indicating stronger entity views, and 76% had average ratings of 4 or above, indicating stronger incremental views. On the ITI items, 29% of participants had average ratings of 3 or below, and 65% had average ratings of 4 or above. These distributions indicated a more incremental and, in that respect, more sophisticated, perspective than distributions that have been documented in previous student samples (Dweck et al., 1995).

We used confirmatory factor analysis to evaluate whether ITT and ITI items formed two distinct factors (that is, whether these sets of items were measuring two distinct constructs) and whether this factor structure was invariant (i.e., the resulting measures behaved similarly) among three groups having different academic backgrounds: liberal arts faculty members ($n = 50$), science and engineering faculty members ($n = 36$), and faculty members from across the remaining participating colleges/schools at the university ($n = 44$). A finding of factorial invariance among different groups provides evidence of a measure's validity (Drasgow, 1984; Horn & McArdle, 1992). A structural equation, multiple group (SEM-MG) factor invariance analysis showed that the best-fitting model had a simple structure, with intelligence items loading only on the ITI factor and teaching items loading only on the ITT factor (RMSEA = .04, with a 90% CI from .00 to .09, $\chi2$ [56] = 56.36). This finding suggested that ITT and ITI items were, indeed, measuring two distinct factors. The two factors were positively correlated (estimated $r = .47$). The model's factorial loadings for the two factors are provided in Table 2. To summarize, this first analysis provided initial evidence of the validity (both convergent and discriminant) of the ITT measure. Further evidence of the validity of the ITT measure was gathered through the analyses presented below.

Table 2
**Factor Loadings From the Structural Equation, Multiple-Group
Invariance Analyses for the Implicit Theories of Intelligence (ITI)
and Implicit Theories About Teaching (ITT) Measures**

Item	ß *ITI*	ß *ITT*
People have a certain amount of intelligence, and they can't really do much to change it.	.953	.000
Someone's intelligence is something that they can't change very much.	.948	.000
People can learn new things, but they can't really change their basic intelligence.	1.000	.000
You can't really teach someone how to be a great teacher; great teachers are born, not made.	.000	.907
You can't really change how well a teacher helps students understand topics or gets students to think critically.	.000	1.000
Someone's teaching may improve a little with training and experience, but it can't be hugely improved.	.000	.960

Relationship Between Implicit Theories of Teaching and Interest in PD

The weights identified in the invariance analysis above were used to derive ITT and ITI factor scores for each participant (hereafter, the terms "ITT scores" and "ITI scores" refer to these factor scores). Two variables were computed as indicators of faculty members' overall interest in professional development: the average of participants' interest ratings across the 15 PD opportunities and the total number of PD items they selected when asked to choose up to 5 of the 15 opportunities in which they would be most interested.

We used regression analyses to examine the relationship between ITT scores and the two interest-in-PD scores. Two additional variables—participants' average scores on the beliefs-about-student-learning-needs items and their ITI scores—were included as covariates in these analyses, allowing us to control statistically for their potential effects. To reiterate, the rationale for including the beliefs-about-student-learning-needs measure as a covariate was that faculty members who did not perceive any problems in the status of student learning needs might not feel it neces-

sary to improve their own teaching practices. ITI scores were included as a covariate to examine whether ITT scores predicted faculty members' interest in PD above and beyond ITI scores; this procedure served as an additional test of the ITT measure's validity. Thus, regression analyses assessed whether faculty members' ITT scores predicted their interest in PD *even after* controlling for beliefs about learning needs and ITI scores.

After controlling for perceptions of students' learning needs and ITI scores, faculty members' ITT scores predicted both their average interest in PD and the total number of PD opportunities they selected, ($\beta = .49$; $p < .001$ and $\beta = .25$; $p = .009$, respectively). Lower scores on the ITT scale, indicating stronger entity views, were associated with lower overall interest in PD and fewer PD opportunities selected.

In a second analysis, we examined whether ITT scores predicted faculty members' interest in the three PD opportunities that we had specified *a priori* as involving high scrutiny of one's teaching practices. To conduct this analysis, an "interest in high-scrutiny PD opportunities" (Int-HS) score was generated for each participant. We examined the validity of the Int-HS measure by examining whether it behaved similarly (that is, it appeared to measure a single construct in a similar way) across two groups that differed most extremely in their ITT scores. The validation procedure was as follows: First, participants who scored at the top 25% ($n = 32$) and bottom 25% ($n = 31$) tails of the ITT score distribution were selected. Second, a SEM multiple-group invariance analysis was used to examine whether the three high-scrutiny items were measuring a single construct, in the same way, across these two extreme groups—which, in fact, they did (RMSEA = .05, with a 90% CI from .000 to .227; $\chi^2[8] = 9.12$). This analysis provided evidence that the three high scrutiny items could defensibly be combined into a single measure. Beta weights generated from the analysis were used to generate a standardized Int-HS factor score for each participant (see Table 3 for the beta weights). Next, a regression analysis was conducted, controlling for perceptions of students' learning needs and ITI scores. Again, faculty members' ITT scores predicted their Int-HS scores ($\beta = .40$; $p < .001$); lower ITT scores, indicating stronger entity views, were associated with lower Int-HS scores.

A final analysis examined whether ITT scores predicted the normativeness of faculty members' PD selections. To reiterate, our rationale was that when entity theorists, who were less interested in PD overall, were asked to choose PD opportunities, they would be more likely to select opportunities that reflected institutional norms rather than their own, individual interests. The procedure used for measuring the "normativeness" of PD selections was as follows (see Barchard and Russell, 2006,

Table 3
**Factor Loadings From the Structural Equation,
Multiple-Group Invariance Analysis
for the Interest in High-Scrutiny PD (Int-HS) Measure**

Item	ß *Int-HS*
Have a colleague, mentor, or teaching consultant observe my class and provide feedback.	.932
Have a teaching consultant videotape my teaching so we can watch and discuss the taped lesson.	1.00
Examine samples of my students' work with my colleagues to better understand what skills my students are (or are not) grasping.	.470

for a description of the proportion consensus scoring procedure): We first determined the proportion of individuals that had selected each PD opportunity. High proportions reflected more normative choices in the sample. The proportion of the sample that selected each PD opportunity is listed in Table 1. Second, all participants who selected a particular PD opportunity were assigned its proportional value; this was done for each PD opportunity they selected. For example, a participant who selected only the first three PD opportunities listed in Table 1 would have been assigned the proportion-selected values of .45, .44, and .41 and zeros for the remaining items. We then averaged the proportions for each individual to generate a *normative-PD* score, a measure of how normative individuals' PD choices were, for each participant. The mean normative-PD score across the sample was .31 (SD = .04). A regression analysis showed that, after controlling for perceptions of students' learning needs and ITI scores, ITT scores significantly predicted normative-PD scores (β = -.28; p = .005). Lower ITT scores were associated with choosing more normative PD opportunities.

Discussion

This study examined whether college faculty members' implicit theories of teaching skills predicted their interest in professional development opportunities for improving their teaching. We found evidence of the validity of the ITT measure, which was important because this measure was developed and used for the first time in this study. In addition, our hypotheses were supported: Faculty members who endorsed entity per-

spectives of teaching skills reported less interest in PD, as evidenced by lower overall interest ratings and fewer PD opportunities selected. Furthermore, entity theories of teaching were associated with lower interest in three PD opportunities that involved high scrutiny of instructors' own teaching practices. Finally, entity views were associated with the selection of more normative PD opportunities. These relationships were observed even after controlling for faculty members' theories of intelligence and their beliefs about students' learning needs, showing that the ITT measure predicted interest in PD above and beyond the two covariates.

Our findings were consistent with prior research (Dweck et al., 1995; Hong et al., 1999; Kasimatis et al., 1996), even though our research context was markedly different. We studied a set of beliefs about teaching skills that, to our knowledge, have not been previously examined. Furthermore, existing research on implicit theories has been primarily conducted with K-12 and college student samples rather than on adults. Finally, our participants were asked to report their interest in PD opportunities that were highly authentic and were like actual opportunities that they would (and do) encounter in their professional lives. The consistency between our findings and others', despite marked differences in research contexts, speaks to the robustness of the implicit-theory phenomenon. Thus, our findings add to the evidence that individuals possess implicit theories about a variety of skills or abilities—intelligence, exercise skill, and, in this case, teaching skills—and these theories appear to guide their choices in a variety of learning contexts. Future studies might examine the extent to which our findings generalize to teachers at the K-12 level. The culture of K-12 education is such that public school teachers face greater expectations and more mandates to engage in professional development on a regular basis. Moreover, relative to higher education, an enormous literature exists on best practice in PD for K-12 teachers; thus, the PD opportunities that were included on our questionnaire may be more familiar to and more normative for teachers at the K-12 level. These conditions may buffer public school teachers from the influences of their implicit beliefs about teaching, weakening the relationships observed in this study. But if the relationships found here still persist, such a study would provide a further test of the implicit-theory phenomenon.

Limitations of the Study

The study's primary limitation was its correlational approach, which does not allow for causal inferences about implicit theories' *effects* on faculty members' reactions to PD opportunities. Nonetheless, the study

is an important first step in establishing an association between these two variables, particularly given the difficulty of garnering participation by college faculty for more time-consuming experimental research. Future research could experimentally manipulate theories to establish whether faculty members' beliefs about teaching skills are causally related to their responses to PD (see Hong et al., 1999, and Kasimatis et al., 1996, for examples). In addition, our future studies could include measures of instructors' perceptions of their own teaching abilities. Hong et al. (1999) have found that entity theorists are particularly vulnerable when they believe that their abilities or skills are low relative to others'. Likewise, Smylie (1988) found that teachers' beliefs about the effectiveness of their own teaching predicted their self-efficacy beliefs about influencing students' learning. Thus, perceptions about one's own teaching abilities may moderate the relationship between implicit theories of teaching and responses to PD opportunities. Finally, though this study established a relationship between faculty members' implicit theories and their self-reported *interest* in PD, the relationship between interest and actual *use* of PD opportunities must be empirically established. Future work can incorporate behavioral measures of faculty members' willingness to participate in PD.

Implications for Faculty Members and PD Efforts

The changing landscape in higher education—including trends in assessment and evaluation, technology, and experiential learning as well as an increasingly diverse student population—necessitate that faculty members acquire new teaching skills or improve existing ones. PD is crucially important to these efforts (Sorcinelli et al., 2005), but faculty members must be willing to avail themselves of these opportunities. Particularly in higher education, where faculty members traditionally have a great deal of autonomy with respect to their professional practices (Shulman, 2004), it is important to understand what variables influence willingness to participate in PD. This study identified one potential variable: faculty members' beliefs about the malleability of their teaching skills. Others have argued that control over choice in learning opportunities can play a role in achievement (Hong et al., 1999). In the case of teaching, the presence of these three conditions—entity beliefs, autonomy, and PD trends that emphasize exactly the kinds of learning opportunities that entity theorists are likely to avoid (Darling-Hammond & Ball, 1998; Loucks-Horsley & Matsumoto, 1999; Richardson, 2003; Saunders & Goldenberg, 2005)—may dissuade some faculty members from taking advantage of PD opportunities that could result in improved teaching.

On the positive side, however, research suggests that it may be possible to change people's implicit theories and/or to buffer against these theories' effects. Experimental studies have managed to shift implicit theories in the short term through fairly simple manipulations: Participants are provided with information that a particular skill or trait can be developed through practice (Hong et al., 1999; Kasimatis et al., 1996). In the long term, attribution re-training has been found to help. Dweck, the investigator most cited for research on implicit theories, provided such re-training to students who had been identified as showing helpless responses to academic challenges (that is, these students tended to give up when faced with challenge). Through several weeks of intensive intervention, the students were taught to attribute setbacks in their learning to controllable factors, such as studying strategies. As a result, they manifested fewer helpless learning behaviors and demonstrated greater improvement in academic performance than a control group (Dweck, 2000).

Finally, this study highlights the similarities between arguably sophisticated college professors and their students when the former are positioned in the role of learners. The sample's sophistication relative to students was evidenced in the score distribution for both implicit theories of intelligence and teaching measures, which reflected more incremental perspectives than has been documented in the literature (Dweck et al., 1995). Yet faculty members who leaned more toward entity perspectives behaved remarkably like students when asked about learning opportunities that could help them improve their teaching skills.

Our findings highlight a viewpoint that is increasingly evident in PD/educational reform literatures and that must be recognized by PD providers: In the context of PD, educators are positioned as learners (Darling-Hammond, 1998; Loucks-Horsley & Matsumoto, 1999), and in this role, they are subject to many of the same influences as other learners. Thus, just as faculty members must strive to take students' existing beliefs/schemas into account when designing instruction (Bransford, Brown, & Cocking, 1999), so too must faculty development efforts take faculty members' existing beliefs and schemas seriously (Hiebert & Stigler, 2000; Miller, 2009; Richardson, 2003; Spillane et al., 2002). Only by incorporating a better understanding of how cognitive factors influence participation in (or resistance to) PD can such efforts engage educators effectively in their own professional development.

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