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*Research  
Report*

# **Multiple Personality Domains in Relation to Occupational Choice and Performance Among Established Teachers**

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## **Abstract**

Does personality impact differently on occupational choice and occupational performance? In a study of established teachers, interests, the Five-Factor Model, and attributions were examined in relation to occupational choice and performance. Attributions were assessed using a new instrument designed for teachers. Choice of teaching specialty was found to be most strongly associated with interest in the arts and sciences, openness to experience, and internal attributions in response to a positive classroom event. On the other hand, quality of teaching assessed by the National Board of Professional Teaching Standards (NBPTS) was associated (negatively) with business interests and with a tendency to externalize blame in response to a problematic teaching situation. Study findings suggested the hypothesis that broad traits located relatively high in a personality hierarchy influence trait matching in selecting an occupation, whereas more specific motivational/dynamic factors located lower in the personality hierarchy influence performance within the chosen niche. The report includes supplemental evidence on the construct validity of the personality measures for assessing teachers.

Key words: Personality, interests, Five-Factor Model, attributions, vocational development, job performance, teachers

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## Introduction

Personality has been conceptualized as an overarching concept encompassing what are believed to be overlapping but largely distinct domains (Allport, 1937; Cattell, 1950; Larson, Rottinghaus, & Borgen, 2002; McAdams, 1997; Pervin, 1990; Waller, Lykken, & Tellegen, 1995). Three such domains are investigated in this study: (a) the Five-Factor Model (FFM), (b) interests, and (c) causal attributions in response to success and failure.<sup>1</sup> The primary aim is to identify relationships between each personality domain and behavior (Funder, 2001), specifically occupation-related behavioral outcomes (Borman, Hanson, & Hedges, 1997; Hogan, Hogan, & Roberts, 1996; Hough, 2003; Hough & Schneider, 1996). Additionally, supplemental evidence is provided on the construct validities of the personality measures used in the study.

In recent years investigators have given particular attention to aligning outcome criteria with appropriate personality characteristics (Barrick, Mitchell, & Stewart, 2003; Borman et al., 1997; Campbell & Knapp, 2001; Hough, 2003; Hough & Ones, 2001; Hogan & Blake, 1996; Hogan & Holland, 2003; Johnson, 2003). As part of this effort, a distinction has been drawn between satisfaction (fulfillment) and satisfactoriness (performance) as behavioral outcomes (Dawis & Lofquist, 1984; Hogan & Blake; Lubinski, 2000; Lubinski & Benbow, 2000; Mount, Barrick, & Ryan, 2003). One aspect of satisfaction is the fulfillment anticipated in choosing a particular career line or occupation. The present study considers how the three personality domains relate to occupational choice as distinct from quality of performance within the chosen occupation.

Drawing in part on the Dawis and Lofquist (1984) theory of vocational development, occupational choice and quality of work are identified as distinctive phases, here called Phases 1 and 2, respectively (see also Tatsuoka, 1956). Phase 1 is an extended period of differentiation of interests and other work-related characteristics, culminating in occupational choice. By contrast, Phase 2 is relatively stable, “characterized by the crystallization and maintenance of a response repertoire” (Dawis & Lofquist, p. 21). In the present interpretation, Phase 1 entails comparing the self’s perceived abilities and personality characteristics to perceived occupational requirements, here called “trait matching” (e.g., Holland, 1997; Lubinski, 2000; Prince & Heiser, 2000, Ryan & Kristof-Brown, 2003; Savickas & Spokane, 1999; Waller et al., 1995). To illustrate, having a strong interest in serving others (e.g., “I like working with young children”) would contribute to trait matching (Waller et al.), perhaps resulting in choice of an occupation emphasizing social service, such as teaching (Holland, 1997). During Phase 2, however, quality of performance within

the occupation is less a matter of trait matching than applying one's skills, knowledge, and other personal resources effectively to the work at hand (Dawis & Lofquist; Hogan & Blake, 1996; Holland, 1997; Johnson, 2003; Lubinski & Benbow, 2000; Waller et al., 1995). In the social service example, the initial trait-matching process would become less salient once the individual becomes a practicing teacher. Then and thereafter, the more relevant questions are occupational satisfaction, and, in the present formulation, whether and how individual differences in social service interests influence quality of performance as a teacher.

In order to better understand these dual functions served by personality, the *same* personality characteristics need to be considered in relation to each phase. If a given personality characteristic relates to occupational selection, an exclusive focus on occupational performance could miss that effect. Also, if a personality characteristic were to relate to performance on the job, an exclusive focus on occupational selection could fail to detect it. Whether and how a given personality dimension (or domain) becomes engaged needs to be considered during both phases. That a given personality characteristic may be functional for occupational choice or for occupational performance, but not both, is perhaps best illustrated by evidence that a close personality-organization fit can be a mixed blessing for subsequent performance (Ryan & Kristof-Brown, 2003; Schneider, Smith, & Goldstein, 2000). Systematic investigation of the dual functions thus offers promise for sharpening our understanding of relationships between personality and behavior in occupational contexts.

In the larger study of which this is a part, participants were established primary and secondary teachers seeking advanced certification from the National Board for Professional Teaching Standards, or NBPTS (National Board for Professional Teaching Standards, 1999). To be eligible for NBPTS certification, the candidate must (a) be a practicing teacher with a baccalaureate degree, (b) be certified in the state where he or she teaches, and (c) have at least 3 years of teaching experience. Of particular importance for this study, the NBPTS assessments are designed to be specialty-specific. Experts from each teaching specialty formulate advanced standards for the specialty, design assessments to meet these standards, and assist in scoring the protocols. In this study, choice of an NBPTS teaching specialty indexes occupational choice, and strength of performance on the specialty-specific NBPTS assessment is used as a continuous variable to measure quality of teaching. The multidomain personality measures, administered

independently of the NBPTS assessments, provide evidence on the role of personality during both phases.

Because data were collected at the time that study participants were active candidates for NBPTS certification, trait matching at the earlier time of specialty selection could only be inferred. Nonetheless, this inference was supported by considerable research on situation selection, trait matching in vocational choice, and stability of personality during adulthood, especially with regard to vocational interests and the FFM. Regarding situation selection, personality and social psychologists have linked a variety of attitudinal and personality factors to the individual's situational choices (Ickes, Snyder, & Garcia, 1997). And, inspired by Scarr and McCartney's (1983) seminal article, developmental and individual-difference psychologists have given considerable attention to how people select their own environments in the course of development (e.g., Emmerich, 1988; Gottfredson, 1999; Lubinski & Benbow, 2000). Likewise, vocational theorists and researchers have long emphasized the processes of self-selection that lead people to make occupational choices that match their interests (Dawis & Lofquist, 1984; Fouad, 1999; Gottfredson; Holland, 1997; Lubinski & Benbow; Prediger, 1999). Regarding stability, interests are known to be quite stable by adulthood (Lubinski, Benbow, & Ryan, 1995; Schmidt, Lubinski, & Benbow, 1998; Swanson, 1999), and stability has been a crucial assumption underlying nature/nurture findings bearing on interests (Betsworth et al., 1994; Bouchard, 1997a, 1997b; Gottfredson; Grotevant, Scarr, & Weinberg, 1977; Plomin, 1986; Plomin, DeFries, McClearn, & Rutter, 1997; Lykken, Bouchard, McGue, & Tellegen, 1993; Scarr, 1992, 1996). Although changes can be expected to occur on FFM dimensions during adulthood (Helson, Jones, & Kwan, 2002; Srivastava, Gosling, & Potter, 2003), it seemed unlikely that such changes would wash out personality differences existing at the time of occupational choice (McCrae & Costa, 2003), a conclusion also supported by nature/nurture studies bearing on the FFM. (Loehlin, 1992; McCrae & Costa; Plomin & Caspi, 1999; Rowe, 1997).

In summary, the following research questions are addressed in this study. Do relationships within and among the three personality domains support the construct validities of the personality measures for established teachers? How do dimensions from each of the three personality domains differentiate among the incumbents of different teaching specialties? How do the same personality dimensions relate to job performance within teaching specialties? Most important, is the impact of a given personality dimension (and/or domain) contingent on whether the occupation-related criterion is specialty choice or performance within the chosen specialty?

## Method

### *Participants*

*Populations.* Fourteen teaching specialties were sampled, each constituting a distinct research population defined as first-time NBPTS candidates in the specialty who completed all 10 exercises required for certification during the 1999–2000 assessment year (roughly September 1 through August 31).<sup>2</sup> In this report, the following abbreviated titles are used to designate the full NBPTS titles (in parentheses) for the 14 teaching specialties, as follows:

- Early Primary (Early Childhood Generalist)
- Late Primary (Middle Childhood Generalist)
- EA Gen. (Early Adolescent Generalist)
- Science 1 (Early Adolescence Science)
- Science 2 (Adolescence and Young Adulthood Science),
- Math 1 (Early Adolescence Mathematics)
- Math 2 (Adolescence and Young Adulthood Mathematics)
- English 1 (Early Adolescence English)
- English 2 (Adolescence and Young Adulthood English Language Arts)
- Art (Early Adolescence through Young Adulthood Art)
- History 1 (Early Adolescence Social Studies/History)
- History 2, (Adolescence and Young Adulthood Social Studies/ History)
- Special Ed. (Early Childhood through Young Adulthood Exceptional Needs Specialist)
- Career/Tech. (Early Adolescence through Young Adulthood Career and Technical Education).

In the above designations, Science 2, Math 2, English 2, and History 2 all refer to teaching at the high school level.

Population *Ns* are reported in Table 1, together with information on relevant background characteristics from the NBPTS database. As seen in Table 1, study populations were predominantly White and female, averaging about 14 years of teaching experience. Table 1 also includes the percentage of candidates passing the NBPTS assessment within each teaching specialty.<sup>3</sup>

*Sampling.* Sampling was affected by several unknowns and constraints. (a) Because participation was voluntary, the sample *Ns* could not be known until after the personality instruments were returned. (b) There was no assurance in advance that sample *Ns* for the smaller teaching specialties would be large enough to include in the analyses (see Table 1). (c) Relatively few participants received all three of the personality instruments.<sup>4</sup> (d) Because the NBPTS assessments are specialty-specific, teaching specialties could not be pooled when analyzing personality-performance relationships. (e) If, as expected, findings were to show that teaching specialties are differentiated on the personality measures, then pooling the personality measures across teaching specialties also would be unwarranted. These factors precluded assignments of instruments to populations in a balanced design. Instead, we took account of the relative population sizes and tried to ensure sufficient diversity among teaching specialties to evaluate generalizability of effects within each of the three personality domains. Only for the larger populations was it possible to assign different combinations of instruments randomly to potential participants.

Assignments of the three personality domains (instruments) to teaching specialties are seen in Table 2, which also provides sample *Ns* for the reliability analyses. Table 3 provides sample *Ns* for tables in this report bearing on each of the three personality domains analyzed one at a time. Table 4 presents sample *Ns* for tables in this report bearing on the conjoint analyses of the personality domains. Due to occasional missing data, the sample *Ns* presented in these tables may be entered as ranges.

**Table 1*****Population Characteristics by Teaching Specialty***

Teaching specialty	<i>N</i> <sup>a</sup>	% White	% Female	Mean age	Mean YTE <sup>b</sup>	% Pass <sup>c</sup>
Early Primary	1,544	84	97	42	13	52
Late Primary	1,339	84	94	42	13	60
EA General	99	93	91	43	13	61
Science 1	223	84	83	43	14	54
Science 2	339	89	63	43	14	58
Math 1	255	81	85	42	14	44
Math 2	240	86	76	42	14	69
English 1	459	83	94	42	14	59
English 2	536	89	88	44	16	54
Art	143	89	83	47	15	50
History 1	163	89	76	41	12	59
History 2	181	88	51	43	14	52
Special Ed.	739	81	93	43	13	39
Career/Tech.	403	84	85	44	14	62
Median		85	85	43	14	54

*Note.* Table entries are for first-time NBPTS candidates in the 1999–2000 cohort.

<sup>a</sup> Population *Ns* vary somewhat, depending on the characteristic. The *Ns* listed here are for % pass.

<sup>b</sup> Number of years of teaching experience. <sup>c</sup> Based on the official NBPTS cut score.<sup>3</sup>



**Table 2*****Sample Ns for Estimating Scale Reliabilities (Alphas)***

Teaching specialty	Domain			
	Interests	FFM	Attributions	NBPTS <sup>a</sup>
Early Primary	534 – 544	809 – 834	300 – 305	851
Late Primary	219 – 222	423 – 440	270 – 275	718
EA General		59 – 62		62
Science 1	125 – 126		123 – 126	126
Science 2	164 – 169		169 – 170	170
Math 1		136 – 141	140 – 142	142
Math 2		118 – 120	122 – 123	123
English 1		235 – 243	243 – 246	247
English 2	319 – 326		327 – 328	328
Art	84 – 86	82 – 86		86
History 1	84 – 88	85 – 87		89
History 2			80 – 81	81
Special Ed	202 – 208	398 – 415		422
Career/Tech	203 – 205	198 – 202		206

*Note.* For the personality domains, entries are ranges of *Ns* across scales within the domain.

<sup>a</sup> For the NBPTS, *Ns* are for participants who completed all 10 NBPTS exercises.

**Table 3*****Sample Ns for the Analyses Within Personality Domains***

Teaching specialty	Personality domain		
	Interests <sup>a</sup>	FFM <sup>b</sup>	Attributions <sup>c</sup>
Early Primary	552	849	298 – 306
Late Primary	223	444	269 – 275
EA General		62	
Science 1	126		123 – 126
Science 2	170		168 – 170
Math 1		142	139 – 142
Math 2		123	121 – 123
English 1		248	239 – 246
English 2	328		318 – 328
Art	86	87	
History 1	89	89	
History 2			80 – 81
Special Ed	209	421	
Career/Tech	206	206	

<sup>a</sup> Ns for Tables 5 and 14. <sup>b</sup> Ns for Tables 15 and 16. <sup>c</sup> Ns (ranges) for Tables 7, 8, and 17.

**Table 4*****Sample Ns for the Personality Interdomain Analyses***

Teaching specialty	Interdomain analysis		
	Interests x FFM <sup>a</sup>	Interests x attributions <sup>b</sup>	FFM x attributions <sup>c</sup>
Early Primary	550	304 – 306	303 – 305
Late Primary	222		
EA General			
Science 1		125 – 126	
Science 2		170	
Math 1			142
Math 2			123
English 1			245 – 246
English 2		327 – 328	
Art	86		
History 1	89		
History 2			
Special Ed.	209		
Career/Tech	206		

*Note.* Due to occasional missing data, some *Ns* are expressed as ranges.

<sup>a</sup> *Ns* for Table 6. <sup>b</sup> *Ns* for Table 9. <sup>c</sup> *Ns* for Table 10.

*Data collection.*<sup>5</sup> The personality instruments were compiled into electronically scannable forms suitable for delivery and return by mail. The position of a personality instrument within the instrument package was roughly counterbalanced among potential participants. The instrument packages included a brief demographic information sheet and a return envelope. Identity codes were assigned and printed on the instrument packages to enable confidential and secure linkages of participant responses to the NBPTS data files. The mailing occurred after 1999–2000 NBPTS candidates had completed all 10 required exercises for advanced certification. An accompanying letter, sent under the auspices of NBPTS and ETS, emphasized the voluntary nature of participation, assured anonymity and confidentiality, and assured respondents that their responses would not enter into NBPTS certification decisions. These procedures were expected to reduce response distortions as well as to meet human subjects guidelines. Participants were asked in the letter to respond to the instruments as sequenced. Follow-up reminders were sent by mail about a month after initial materials were sent.

Awareness of whether one had passed or failed the NBPTS assessment appeared likely to influence responses. Accordingly, respondents were excluded from the study if their returned instruments were postmarked on or after the date that the official 1999–2000 NBPTS scores were released. The vast majority of actual respondents completed all or almost all of the personality items sent to them; those few who returned instruments that were very incomplete (e.g., missing pages) were excluded from the study. For most of the personality scales, participants responding to fewer than two thirds of the items on a particular scale were excluded from all analyses involving that scale. For a few of the shorter scales, this criterion was lowered to 60%, but no score scale was based on fewer than three items, and such exclusions were infrequent. For participants who did not respond to all of the items on a scale, but who met the completion criterion for that scale, the full-scale score was estimated on the basis of the participant's mean scale value for those items answered.

### ***Sample Characteristics and Representativeness***

For the 14 teaching specialties, NBPTS candidates meeting the above criteria for inclusion in the study ranged from 45% to 63% of their respective populations, with a median of 55%. These participation levels were satisfactory and even noteworthy, as the NBPTS assessments are time consuming, the personality instruments were sent by mail, and participation in the study was voluntary and unremunerated.

Tests of participation levels (sample/population comparisons) were run in relation to the characteristics included in Table 1. Based on chi square tests, participation rates differed significantly ( $p < .05$ ) between White and non-White participants in only 2 of the 14 teaching specialties, and between females and males in only one of the 14 specialties. Participants tended to be slightly older (Mdn. = 44 years) than their respective populations (Mdn. = 43 years), and, based on z-tests, the difference was significant in 5 of the 14 specialties. Also, participants tended to have slightly more teaching experience (Mdn. = 15 years) than their respective populations (Mdn. = 14), and this difference was significant in 4 of the 14 specialties. Most important, the possibility of sample bias in terms of quality of teaching was tested. One-proportion z-tests revealed only 1 in 14 specialties for which the sample pass rate differed significantly from that for its corresponding population. Overall, then, study samples exhibited some differences from their respective populations, but the differences were minor. The fact that participants were volunteers appears to have introduced little sampling bias, at least with regard to these characteristics.

### ***Measures of Teaching Quality***

*NBPTS assessments.* NBPTS assessments within teaching specialties include 10 exercises that are designed, developed, and scored by experts in education and educational assessment. Several of the exercises entail “portfolios” based on classroom videotapes and written documentation of student work. In addition, exercises designed to assess content/pedagogical knowledge and skills are administered at an assessment center. Also included is documentation of the candidate’s professional activities and outreach to families and community. The breadth, depth, and contextualized nature of these expert-designed assessments suggest that they yield ecologically valid measures of occupational performance in the teaching profession. It is worth reiterating that, because the NBPTS assessments administered to each teaching specialty are specific to that specialty, NBPTS scores are *noncomparable* across teaching specialties, calling for separate statistical analyses by teaching specialty.

*Structure and reliabilities.* Preliminary principal component analyses of the NBPTS exercise correlation matrices were conducted (without rotation) on study participants separately by teaching specialty. For each teaching specialty, several meaningful factors were extracted. However, a large general factor emerged in all 14 specialties. Moreover, the second and third factors were more clearly interpretable in terms of procedural aspects of the assessment (e.g., portfolio vs. assessment center) than in terms of underlying psychological or educational content

or processes. These results indicated that a single summary score could serve as an index of overall teaching quality. Accordingly, each participant's 10 exercise scores were summed to form an (unweighted) composite. The internal-consistency reliability (alpha) of the composite score was estimated separately within each of the 14 teaching-specialty samples. These alphas ranged from .70–.80 across the 14 teaching specialties, with a median of .76.

### ***Five-Factor Model Measures***

*Instrument.* The Air Force Self-description Inventory (Christal, 1994; Digman, 1996; Tupes & Christal, 1992) was used to measure the FFM.<sup>6</sup> Based on factor analytic procedures, this instrument provides scores for Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness to Experience, and a number of facets subsumed by each of the five dimensions (Christal, 1994). In more recent studies, this instrument yielded dimension and/or facet scores having meaningful relationships with other variables (Davies, Stankov, & Roberts, 1998; Roberts, Zeidner, & Matthews, 2001).

*Response scales and instructions.* In the first section of the instrument, items are presented as adjectives (e.g., “unkind”), each to be rated on a 9-point scale extending from “extremely uncharacteristic” (1) through “neutral” (5) to “extremely characteristic” (9). In the second section, items are presented as statements, such as “I have periods when I feel sorry for myself,” each to be rated on a 7-point scale extending from “very strongly disagree” (1) through “neutral” (4) to “very strongly agree” (7). Items are sequenced randomly within each section.

In both sections respondents are instructed to decide how well each item “describes you,” then to reply to all of the items, compare the self with others of the same sex and age, give first impressions, and try to avoid using the extreme and neutral scale points. For illustrative purposes, each section provides a sample item.

*Scoring and reliabilities.* The 9-point adjective scales were transformed linearly into 7-point scales, thereby equalizing the weights of adjectives and statements in deriving scores. Dimension and facet scoring were in accordance with the guidelines provided by Christal (1994). The number of scale items used to score Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness were 28, 34, 26, 36, and 28, respectively. The internal-consistency reliability of each FFM dimension was determined separately by teaching specialty for participants having no missing responses. For the 10 teaching specialties, median alphas were .94 for Extraversion (range

of .91–.95), .94 for Agreeableness (range of .92–.95), .91 for Conscientiousness (range of .87–.93), .94 for Neuroticism (range of .92–.96), and .89 for Openness to Experience (range of .87–.90).

### ***Interest Measures***

*Instrument.* John Holland’s RIASEC model was adopted for measuring interests (Holland, 1996, 1997). The RIASEC model includes six interest categories: Realistic (R), Investigatory (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C). The present study utilizes interest scales from the ACT Interest Inventory (UNIACT-R, Level 2), one of several self-report instruments designed to measure the RIASEC categories. For the UNIACT, the six RIASEC category labels noted above are translated as follows: Technical (R), Science (I), Arts (A), Social Service (S), Business Contact (E), and Business Operations (C) (Swaney, 1995).<sup>7</sup> The UNIACT-R (Level 2) includes as items 90 activity statements suitable for adults, with 15 items included within each of the six interest scales (Swaney, 1995, Appendix D). Directions (slightly modified here) and the response scale ask participants to judge how much they would like each of the 90 listed activities on a three-point scale (“Like,” “Indifferent,” “Dislike”). In accordance with UNIACT scoring procedures, a participant’s scale score was not to be included in the analysis if fewer than 10 of the 15 items on the scale were scorable (Swaney, Appendix F). In fact, no respondents were excluded on this basis.

*Reliabilities.* The internal-consistency reliability of each interest scale was determined separately by teaching specialty for participants having no missing responses on the scale. For the nine teaching specialties: alpha medians were .90 for Science (range of .74–.93), .82 for Technical (range of .79–.87), .90 for Business Operations (range of .89–.93), .83 for Business Contact (range of .81–.86), .74 for Social Service (range of .55–.79), and .87 for Arts (range of .77–.89). Although satisfactory for research purposes, the Social Service alphas were relatively low, probably due to restricted variances on this scale because teachers generally hold this interest in common (Holland, 1997, Appendix B; Swaney, 1995). Except for the Social Service scale, the above medians are consistent with reliabilities reported in the *UNIACT Manual for the Twelfth Grade 1993 norms sample*, which consisted of 2,219 males and 2,426 females (Swaney, 1995, Table 4.1).

### ***Attribution Measures***

Based on attribution theory (Weiner & Graham, 1999), the Attribution Inventory for Teachers—Short Form (AIT-S) was developed as a new instrument for teachers.<sup>8</sup> Because this instrument is new, it is described here and later evaluated in considerable detail.

*Format.* The AIT-S assesses causal attributions for an unsuccessful teaching event (Exercise 1) and for a successful teaching event (Exercise 2). Page 1 of the AIT-S includes, in sequential order, the task description, the first scenario (Exercise 1), the response scale, and 16 items bearing on the first scenario. Page 2 includes the second scenario (Exercise 2), the same response scale, and a different set of 16 items bearing on the second scenario.

The task description and two scenarios are as follows:

In the two exercises that follow, teaching situations are portrayed. You are asked to respond by projecting yourself into the role of the teacher.

**Exercise 1:** Yesterday you discussed several new concepts during class. However, a number of students had problems understanding your discussion, and these problems were not cleared up during class. Today you are trying to figure out what caused the students to have these problems.

**Exercise 2.** During the first part of the school year one of your students was performing below his academic potential and seemed uninvolved in class activities. Then, about a month ago, the student began to make substantial progress, both with regard to his involvement in class and his academic performance. Now you are considering what might have happened a month ago to produce these changes in the student's behavior.

*Response scale.* Although attribution theory treats underlying causal dimensions as bipolar (e.g., internal *versus* external locus), it was thought that bipolar response scales might not be optimal for purposes of measurement (Hewstone, 1989). As an alternative, unipolar scales were used to measure each pole of a causal dimension. In this procedure, the attribution task is structured so as to enable participants to make probabilistic judgments that take account of multiple causation in explaining each event. The AIT-S unipolar response scale and instructions are as follows:



***Recording your responses:*** Below is a list of explanatory statements. For each statement, consider the extent to which it explains the above situation based on your own personal experience as a teacher. Bear in mind that more than one statement may ring true or have at least some plausibility in explaining what happened.

### **Rating Scale**

For each statement: Mark "0" if the statement is implausible as an explanation of what happened, mark "1" if the statement is somewhat plausible as an explanation of what happened, or mark "2" if the statement rings true as an explanation of what happened.

*Item types.* Each AIT-S item (explanatory statement) was written to fit one of four item types for an exercise: internal-stable, internal-unstable, external-stable, and external-unstable. The short form includes four items per item type, with text adapted to fit one of the two exercises (scenarios), resulting in 16 items for each of the two exercises.<sup>9</sup>

Also considered was controllability, the third causal dimension of attribution theory. An index of controllability would indicate whether the teacher believes that he or she is able to alter the cause underlying the depicted classroom event, which is of obvious importance for teaching. However, the concept of controllability cannot be fully distinguished from the concept of stability, precluding the possibility of splitting each of the item types noted above into high control and low control variants. Nonetheless, as will be shown shortly, it was possible to classify most of the AIT-S item types in terms of controllability—even though this was not the guiding dimension when item text was written.

Yet another important concept from attribution theory is the hedonic bias, "... the tendency to take credit for success and/or to attribute failure to factors external to the self" (Weiner & Graham, 1999, p. 607). This tendency is normative (applicable to most people), but it is also relevant to individual differences, overlapping with such constructs as self-serving bias, self-esteem, ego defensiveness, self-efficacy, optimism, and narcissism. To facilitate the presentation, this tendency is here called "self-enhancement."

*Item contents and codings.* The following coding scheme is used in Table 5 and throughout this paper to designate the eight AIT-S item types: P (positive event scenario) vs. N (negative event scenario) in the first position, I (internal locus) vs. E (external locus) in the second position, S (stable) vs. U (unstable) in the third position, C (controllable) vs. U (uncontrollable) in the fourth position, and H (relatively high self-enhancement) vs. L (relatively low self-enhancement) in the fifth position. Table 5 also provides an illustrative item for each of the eight item types.

It is worth noting that, for certain item types (PISCH, PIUCH, PEUUL, and NISUL), controllability and self-enhancement are fully yoked, making them indistinguishable from each other when interpreting functional relationships with other variables. However, the two dimensions are partially unyoked for three item types (PES?L, NIEUC?, NEU?H), and fully unyoked for one (NESUH). Because the latter item types disentangle controllability and self-enhancement from each other, at least in part, they become especially useful for identifying *differential* relationships between attribution dimensions and other variables.

*Scoring.* Item responses were scored 0 to 2, with a response of 2 (“rings true”) signifying strong endorsement of the item’s content as a cause of the event depicted in the scenario. For each item type, a participant’s score was the mean of his or her responses to the four items for that item type.

*Reliabilities.* In preliminary item analyses, all items contributed to their respective item-type scores and were retained. Because the AIT-S includes only four items per item type, however, internal-consistency reliabilities were expected to be acceptable for research purposes, but not high. Consistent with these expectations, median internal-consistency reliabilities ranged from .46 to .66 across the eight item types (see the diagonal of Table 9).

**Table 5*****AIT-S Item Type Codes and Illustrative Items***

Codes <sup>a</sup>	Illustrative items from the AIT-S
PISCH	I am an enthusiastic teacher, which stimulates my students to become good learners sooner or later.
PIUCH	I consulted with another member of the school staff who is especially experienced in dealing with such problems.
PES?L <sup>b</sup>	The student, who is shy, began to feel more comfortable in class.
PEUUL	It was just one of those lucky breaks, for him and for me.
NISUL	Although I understood the concepts I was presenting, communicating complex ideas to students is not one of my strong points.
NIUC? <sup>c</sup>	The material I presented in class was fine, but I know a better way to sequence this material so that it will facilitate learning.
NESUH	This class has an unusually high proportion of academically weak students.
NEU?H <sup>d</sup>	Although I was well prepared, it was one of those class sessions in which unpredictable events made it difficult for the students to pay attention.

<sup>a</sup> The item types are coded as follows: In the first position, P signifies the positive event (scenario) and N the negative event; in the second position, I signifies internal locus and E external locus; in the third position, S signifies stable and U, unstable; in the fourth position, C signifies controllability and U uncontrollability; in the fifth position, H signifies relatively high self-enhancement and L relatively low self-enhancement. <sup>b</sup> The cause is only passively controllable, by standing back and letting events unfold, making this item type ambiguous on the controllability dimension. <sup>c</sup> Although the portrayed teacher response is likely to be effective and thereby self-enhancing, this item type also implies that the self made a mistake, creating ambiguity on the self-enhancement dimension, a possible performance inhibitor (Weiner & Graham, 1999). <sup>d</sup> No special effort on the teacher's part is required to resolve the situation, a passive form of control that makes this item type ambiguous on the controllability dimension.

## **Preliminary Findings: Construct Validity of the Personality Measures**

### ***Interest Measures***

Relationships among the six UNIACT scales are reported in Table 6. In two important respects, structural findings are consistent with theory and research on vocational interests: (a) The median *r*s do not deviate much from correlations reported for the UNIACT national norms groups in Grade 12 in 1993, based on 2,218 males and 2,427 females (Swaney, 1995, Table 7.2); (b) For the most part, the ordering of correlations in Table 6 is consistent with the Holland circular model for interests (Hogan & Blake, 1996; Holland, 1997; Rounds & Day, 1999; Rounds & Tracey, 1993; Tracey & Rounds, 1993, 1997). Yet there is a conspicuous inconsistency, namely the (median) correlation of +.28 between the Technical scale and the Social Service scale. This positive relationship is inconsistent with the circular model, which places these two interests at opposite points on the circle. Yet it is understandable that technical and social service interests would be positively associated among established teachers, as these two interests are both salient for the teaching profession.

### ***FFM Measures***

To the best of our knowledge, the Air Force Self-description Inventory had not been used previously with teachers. However, previous research on relationships between the FFM dimensions and vocational interests had yielded converging findings (Barrick, Mount, & Gupta, 2003; Costa, McCrae, & Holland, 1984; Gottfredson, Jones, & Holland, 1993; Holland, 1999; Larson et al., 2002; Waller et al., 1995). These convergences provide a basis of comparison with the present study. As seen in Table 7, among established teachers Extraversion is associated very consistently with interests in social service and business contact, Agreeableness is associated very consistently with social service interests, and Openness to Experience is associated very consistently with interest in science and the arts. These convergences are strikingly similar to those reported in two recent meta-analysis of relationships between the FFM and interests (Barrick et al., 2003; Larson et al., 2002). There are also trends for business interests to correlate positively with Conscientiousness, and for interests (generally) to correlate negatively with Neuroticism. These findings provide considerable support for the conclusion that the Air Force Self-description Inventory yields FFM measures that are suitable for use with established teachers.

**Table 6*****Median Pearson rs Among the UNIACT Interest Scales***

Interest scale	S	T	BO	BC	SS	A
S	(.90)					
T	<b>.42<sup>9</sup></b>	(.82)				
BO	.06 <sup>1</sup>	<b>.36<sup>8</sup></b>	(.90)			
BC	.10 <sup>2</sup>	<b>.19<sup>7</sup></b>	<b>.45<sup>9</sup></b>	(.83)		
SS	<b>.29<sup>8</sup></b>	<b>.28<sup>8</sup></b>	.10 <sup>3</sup>	<b>.48<sup>9</sup></b>	(.74)	
A	<b>.36<sup>8</sup></b>	<b>.37<sup>8</sup></b>	-.03 <sup>0</sup>	<b>.20<sup>9</sup></b>	<b>.35<sup>9</sup></b>	(.87)

*Note.* S = Science; T = Technical; BO = Business Operations; BC = Business Contact; SS = Social Service; A = Arts. Main entries are median correlations across the nine teaching specialties (see Table 3 for the sample *Ns*). For boldface entries, the correlation is significant ( $p < .05$ ) for at least six of the nine teaching specialties. Superscripts indicate the number of teaching specialties (out of nine) for which  $p < .05$ . Median alphas across teaching specialties are entered in the diagonal (see Table 2 for the sample *Ns*).

**Table 7*****Relationships Between Interests and the Five-Factor Model***

FFM	Interest					
	S	T	BO	BC	SS	A
Extraversion	.01 <sup>2</sup>	-.02 <sup>1</sup>	-.01 <sup>0</sup>	<b>.33<sup>6</sup></b>	<b>.25<sup>6</sup></b>	<b>.14<sup>4</sup></b>
Agreeableness	.10 <sup>3</sup>	.07 <sup>2</sup>	.00 <sup>1</sup>	.09 <sup>2</sup>	<b>.34<sup>6</sup></b>	.14 <sup>3</sup>
Conscientiousness	.00 <sup>0</sup>	.05 <sup>1</sup>	.16 <sup>3</sup>	<b>.20<sup>4</sup></b>	.08 <sup>1</sup>	.01 <sup>1</sup>
Neuroticism	<b>-.16<sup>4</sup></b>	-.12 <sup>3</sup>	-.04 <sup>1</sup>	-.13 <sup>3</sup>	-.16 <sup>3</sup>	-.06 <sup>1</sup>
Openness	<b>.46<sup>6</sup></b>	.18 <sup>3</sup>	.00 <sup>0</sup>	.10 <sup>2</sup>	.12 <sup>3</sup>	<b>.35<sup>6</sup></b>

*Note.* S = Science; T = Technical; BO = Business Operations; BC = Business Contact; SS = Social Service; A = Arts. Main entries are median correlations across the six teaching specialties (see Table 4 for the sample *Ns*). For boldface entries, the correlation is significant ( $p < .05$ ) in at least four of the six teaching specialties. Superscripts indicate the number of teaching specialties (out of six) for which  $p < .05$ .

### ***Attribution Measures***

Because the AIT-S is a new instrument for assessing attributions, and because this instrument utilizes unipolar rather than bipolar response scales, special attention is given here to evaluating its construct validity.

*Normative findings.* In attribution theory, such dimensions as controllability and self-enhancement are considered to be normative (applicable to most people). Accordingly, response scale *means* for the AIT-S item types should be orderable in terms of extent of controllability and/or self-enhancement. As seen in Table 8, normative results generally reflect the concepts of controllability and hedonic bias in attribution theory (Weiner & Graham, 1999). Most striking, when controllability is fully yoked to high self-enhancement (PIUCH and PISCH), the outcome is a high mean scale score in absolute terms (Mdns. = 1.59 and 1.54, respectively). In contrast, when uncontrollability is fully yoked to low self-enhancement, the mean scale score is relatively low in response to the positive event (PEUUL, Mdn. = .72), and very low in response to the negative event (NISUL, Mdn. = .14).

**Table 8**  
***Summary of Normative Results for the AIT-S Item Types***

Item type code	Mean <sup>a</sup>	Range <sup>b</sup>	S.D. <sup>c</sup>
PIUCH	1.59	1.54 – 1.81	.32
PISCH	1.54	1.40 – 1.65	.38
PES?L	1.03	.98 – 1.18	.40
NIUC?	.98	.86 – 1.02	.41
NEU?H	.93	.85 – .99	.41
PEUUL	.72	.64 – .77	.37
NESUH	.71	.60 – .79	.41
NISUL	.14	.07 – .18	.23

*Note.* See Table 5 for the item type code definitions. See Table 3 for the sample *Ns*.

<sup>a</sup> Median of means across teaching specialties. <sup>b</sup> Range of means across teaching specialties.

<sup>c</sup> Median of standard deviations across teaching specialties.

In their review of the self-serving bias in the attribution literature, Miller and Ross (1975) concluded that positive events elicit stronger self-attributions than negative events, suggesting that people are more likely to perceive a relationship between their own behavior and an outcome when the outcome is favorable. Consistent with this conclusion, mean scale scores for the positive

internal locus item types (PISCH and PIUCH) were much higher than those for the negative internal locus item types (NIUC? and NISUL) (Table 8). In interpreting the basis for this contrast, Miller and Ross emphasized cognitive factors, whereas subsequent writers emphasized motivational/affective factors (Hewstone, 1989; Zuckerman, 1979). In this regard, participants in the present study probably experienced an initial threat to self-esteem (primary appraisal) when responding to the negative event scenario. From the standpoint of attribution theory, such primary appraisals are outcome-dependent but attribution-independent (Weiner & Graham, 1999). Yet they seem likely to evoke wariness in making attributions to the self. For the NISUL item type in particular, internal attributions would acknowledge that the self is incompetent, a threatening prospect indeed. In the case of NIUC?, internal attribution entails a belief in the efficacy of increased effort, but this item type also signifies, at least tacitly, that the self was responsible for the initial problem depicted in the scenario. In both cases, then, it appears that the primary appraisal entailed negative affect, which, in turn, dampened internal attributions in response to the negative event.

Table 8 also presents evidence that controllability plays a role that is distinct from that of self-enhancement. In response to the positive event, the mean scale score for the item type signifying passive control (PES?L, Mdn. = 1.03) is consistently higher than that signifying absence of control (PEUUL, Mdn. = .72). In response to the negative event, the mean scale score for the item type signifying full control is relatively high (NIUC?, Mdn. = .98), as is that signifying passive control (NEU?H, Mdn. = .93), whereas total lack of control yields relatively low mean scale scores (NESUH and NISUL, Mdns. = .71 and .14, respectively.) It should be noted, however, that these contrasts also are explicable in terms of stability (negative expectancies), as stability and uncontrollability are virtually indistinguishable psychologically in the context of a negative event.

*Relationships among item types.* Relationships among the AIT-S item types are reported in Table 9. Most of the intercorrelations are positive, some nontrivial in magnitude and/or in their consistency across teaching specialties. Regarding polarity, the general absence of negative relationships within the positive event (Item Types 1-4 in Table 9) and within the negative event (Item Types 5-8 in Table 9) lends credence to the idea that the poles of the dimensions of attribution theory are in fact unipolar at the level of measurement. Further discussion of this matter is deferred until other results on the AIT-S are presented.

Locus of control is an organizing dimension, both in conjunction with stability and instability, but clearly more so for the positive event (Mdn.  $r_s = .46$  and  $.55$ , respectively) than for the negative event (Mdn.  $r_s = .29$  and  $.35$ , respectively). As implied earlier, the yoking of controllability and self-enhancement (or their opposites) was expected to be more likely for the positive event than for the negative event. Now we see that in responding to the positive event, locus is a powerful organizer, whereas for the negative event, controllability and self-enhancement appear to be less likely to operate in concert, presumably weakening (but not eliminating) locus as an organizer.

**Table 9**  
*Relationships Among the AIT-S Item Types*

Item type	1	2	3	4	5	6	7	8
1. PISCH	(.66)							
2. PIUCH	<b>.46</b> <sup>9</sup>	(.53)						
3. PES?L	.20 <sup>5</sup>	.08 <sup>2</sup>	(.62)					
4. PEUUL	.03 <sup>1</sup>	.09 <sup>2</sup>	<b>.55</b> <sup>9</sup>	(.51)				
5. NISUL	-.14 <sup>5</sup>	-.04 <sup>2</sup>	.08 <sup>2</sup>	.12 <sup>4</sup>	(.46)			
6. NIUC?	-.06 <sup>2</sup>	.14 <sup>3</sup>	.13 <sup>4</sup>	.17 <sup>5</sup>	<b>.29</b> <sup>7</sup>	(.57)		
7. NESUH	.05 <sup>3</sup>	.00 <sup>0</sup>	<b>.26</b> <sup>8</sup>	<b>.19</b> <sup>8</sup>	.17 <sup>5</sup>	-.01 <sup>1</sup>	(.56)	
8. NEU?H	.09 <sup>1</sup>	.15 <sup>5</sup>	<b>.30</b> <sup>8</sup>	<b>.29</b> <sup>9</sup>	<b>.14</b> <sup>6</sup>	.22 <sup>5</sup>	<b>.35</b> <sup>9</sup>	(.62)

*Note.* See Table 5 for the item type code definitions. Entries are median correlations across the nine teaching specialties (see Table 3 for the sample  $N_s$ ). Superscripts indicate the number of teaching specialties (maximum of nine) for which the correlation is significant ( $p < .05$ ). For boldface entries, the correlation is significant ( $p < .05$ ) in at least six of the nine teaching specialties. Median alphas across teaching specialties are entered in the diagonal (see Table 2 for the sample  $N_s$ ).

It is also worth noting that the four measures of external locus are positively intercorrelated quite consistently (in at least eight of nine instances) across teaching specialties. This pattern suggests that the tendency to invoke external attributions transcends the affective valence of the eliciting event, perhaps defining a broader personality characteristic than heretofore realized.

*AIT-S in relation to interests.* The interest scales and the AIT-S were both administered to four teaching specialties. Relationships of the six interest scales with the eight AIT-S item types are presented in Table 10.



**Table 10*****Relationships Between Attributions and Interests***

AIT-S item types	Interest scales					
	S	T	BO	BC	SS	A
PISCH	.10 <sup>1</sup>	.02 <sup>0</sup>	.06 <sup>1</sup>	<b>.26<sup>4</sup></b>	<b>.23<sup>3</sup></b>	.13 <sup>2</sup>
PIUCH	<b>.14<sup>3</sup></b>	.05 <sup>0</sup>	.01 <sup>0</sup>	.13 <sup>2</sup>	<b>.17<sup>3</sup></b>	.09 <sup>2</sup>
PES?L	.00 <sup>0</sup>	.01 <sup>0</sup>	.09 <sup>1</sup>	.06 <sup>0</sup>	-.03 <sup>0</sup>	-.04 <sup>0</sup>
PEUUL	.02 <sup>1</sup>	-.02 <sup>1</sup>	.07 <sup>1</sup>	.04 <sup>1</sup>	-.02 <sup>0</sup>	-.03 <sup>1</sup>
NISUL	-.15 <sup>2</sup>	-.07 <sup>0</sup>	.01 <sup>1</sup>	-.07 <sup>1</sup>	-.09 <sup>1</sup>	-.05 <sup>1</sup>
NIUC?	-.03 <sup>0</sup>	.00 <sup>0</sup>	-.01 <sup>0</sup>	-.02 <sup>0</sup>	.04 <sup>0</sup>	.07 <sup>0</sup>
NESUH	-.02 <sup>0</sup>	.02 <sup>1</sup>	.01 <sup>0</sup>	.02 <sup>0</sup>	.00 <sup>0</sup>	-.03 <sup>0</sup>
NEU?H	.04 <sup>0</sup>	.00 <sup>0</sup>	.04 <sup>0</sup>	.01 <sup>1</sup>	.05 <sup>2</sup>	.03 <sup>0</sup>

*Note.* See Table 5 for the item type code definitions. S = Science; T = Technical; BO = Business Operations; BC = Business Contact; SS = Social Service; A = Arts. Main entries are median correlations across the four teaching specialties (see Table 4 for the sample *N*s). For boldface entries, the correlation is significant ( $p < .05$ ) in at least three of the four teaching specialties. Superscripts indicate the number of teaching specialties (out of four) for which  $p < .05$ .

As seen in Table 10, attributions are largely orthogonal to interests for the external locus and negative event item types. For six of the eight item types, then, the two sets of personality measures are quite distinct from each other. Also, attributions are largely independent of Business Operations and Technical interests, not surprising for teacher attributions in response to classroom events. Regarding convergence between the two domains, Social Service and Business Contact interests are positively associated with positive-event internal attributions based on ability (PISCH), suggesting that self-judgments regarding leadership may link the two domains. For positive-event internal attributions based on effort (PIUCH), the pattern is similar though not identical, extending to interest in Science.

*AIT-S in relation to the FFM.* The FFM scales and AIT-S were both administered to four teaching specialties. Relationships of the five FFM scales with the eight AIT-S item types are presented in Table 11.

**Table 11*****Relationships Between Attributions and the FFM***

AIT-S item type	FFM dimension				
	E	A	C	N	O
PISCH	.17 <sup>2</sup>	<b>.25</b> <sup>4</sup>	<b>.21</b> <sup>4</sup>	-.03 <sup>1</sup>	<b>.24</b> <sup>4</sup>
PIUCH	.12 <sup>1</sup>	<b>.17</b> <sup>3</sup>	.12 <sup>2</sup>	-.05 <sup>0</sup>	.17 <sup>2</sup>
PES?L	.00 <sup>0</sup>	-.04 <sup>0</sup>	.00 <sup>0</sup>	.09 <sup>2</sup>	-.01 <sup>0</sup>
PEUUL	.03 <sup>1</sup>	-.06 <sup>0</sup>	-.04 <sup>1</sup>	.09 <sup>1</sup>	.00 <sup>1</sup>
NISUL	-.11 <sup>2</sup>	-.12 <sup>2</sup>	-.15 <sup>2</sup>	<b>.22</b> <sup>3</sup>	-.18 <sup>2</sup>
NIUC?	.00 <sup>0</sup>	<b>-.13</b> <sup>3</sup>	<b>-.16</b> <sup>4</sup>	<b>.15</b> <sup>3</sup>	.03 <sup>0</sup>
NESUH	-.04 <sup>1</sup>	-.06 <sup>1</sup>	.06 <sup>0</sup>	.10 <sup>2</sup>	-.07 <sup>2</sup>
NEU?H	-.06 <sup>0</sup>	-.01 <sup>0</sup>	-.01 <sup>0</sup>	.11 <sup>1</sup>	-.01 <sup>0</sup>

*Note.* See Table 5 for the item type code definitions. E = Extraversion; A = Agreeableness; C = Conscientiousness; N = Neuroticism; O = Openness to Experience. Main entries are median correlations across the four teaching specialties (see Table 4 for the sample *N*s). For boldface entries, the correlation is significant ( $p < .05$ ) in at least three of the four teaching specialties. Superscripts indicate the number of teaching specialties (out of four) for which  $p < .05$ .

As seen in Table 11, the FFM dimensions generally are orthogonal to the four *external* locus item types. On the other hand, the four *internal* locus item types entered into several cross-domain relationships. In this regard, it is worth noting that the FFM items and the AIT-S internal locus items share an important feature: both are reflexive in the sense that they refer to a characteristic of the self. Unlike the FFM, however, the AIT-S external locus items, though based on self-report, refer to the external world and therefore are *not* reflexive. We suspect that this contrast helps explain why the latter, but not the former, are generally independent of the FFM.

As also seen in Table 11, the cross-domain linkages for internal locus in relation to the positive event (PISCH and PIUCH) typically are of opposite sign to those for internal locus in relation to the negative event (NISUL and NIUC?). This polarization of internal locus as a function of event valence is consistent with the concept of hedonic bias, suggesting that it is specifically self-enhancement that links these two domains. Indeed, the pattern of sign switches noted above suggests the presence of a single overarching factor that links the two domains. In this regard, Saucier and Goldberg (2003) have identified a single superfactor for the FFM personality domain, which they label “evaluation”. Because the FFM domain was assessed in the present study using reflexive self-reports, the more precise label here is “self-enhancement” or “self-evaluation”. In

this regard, other research linking self-esteem to the FFM has shown that self-esteem, a close cousin of self-evaluation, is associated with the same overarching superfactor (Robin, Tracy, Trzesniewski, Potter, & Gosling, 2001).

*Implications for the AIT-S item-types codes.* As noted earlier, NIUC? items imply proactive control (the teacher can prevent recurrence of the negative event), but ambiguity regarding self-enhancement (the negative event might have been triggered by a teaching error). In this regard, it is of interest that the NIUC? item type is *negatively* associated with Agreeableness and Conscientiousness and *positively* associated with Neuroticism (Table 11). This pattern of correlates suggests that NIUC? signified low self-enhancement for at least some participants. On the other hand, NIUC? was the most highly endorsed item type in relation to the negative event (Table 8). Given such contrasting outcomes with regard to self-enhancement, present assignment of the ambiguous self-enhancement code to this item type appears to be justified—pending further evidence on the matter.

Earlier it was noted that the negative affect elicited by the negative scenario probably dampened attributions (relative to the positive scenario). This contrast has implications for coding and interpreting different manifestations of the hedonic bias. Specifically, mean scale scores for the positive internal locus items (PISCH, PIUCH) were much higher than those for the negative external locus item types (NESUH, NEU?H) (Table 8). This outcome suggests that classifications in terms of the hedonic bias, such as those presented in Table 5, are properly viewed not as absolute, but rather as contingent on the affective valence of the eliciting event.

## **Results: Personality Differences Among Teaching Specialties**

### ***Impact of Years of Teaching Experience***

Personality differences among teaching specialties are identified in this study using discriminant function analyses. For established teachers, however, relationships between personality and occupation-related outcomes could be altered by age-related influences, such as extent of teaching experience, other sources of developmental change, cohort membership, and/or selective attrition. Because this study is cross-sectional, using number of years of teaching experience (YTE) as an index of age-related influences would confound these factors, greatly complicating interpretations of age-related effects (Schaie, 1973). Nonetheless, *negative* evidence regarding the impact of YTE as a covariate would be informative, as such evidence would cast

doubt on the influence of any of the confounded factors. Accordingly, preliminary discriminant function analyses were conducted to determine whether inclusion of YTE as a covariate would affect the findings. Then, YTE was excluded in analyses identical to the first in all other respects. For each of the three personality domains, comparison of the two sets of results revealed very minor changes in the partial  $r^2$  values, indicating that, for these domains, YTE has minimal impact on differentiation among the teaching specialties.

**Interests**

*Discriminant function analysis.* The nine teaching specialties included in this analysis are listed in Table 3. In the overall multivariate test of the discriminant functions,  $\Lambda = .61$ ,  $F = 21.39$ ,  $df = 48, 9,722$ ,  $p < .001$ . The first two discriminant functions account for 86% of the between-group variance, and the canonical correlations are .49 and .37, respectively.<sup>10</sup>

Standardized coefficients for each of the first two discriminant functions are presented in Table 12. For the first factor the major definer is interest in arts *versus* interest in science, and for the second factor the major definer is interest in arts *and* sciences *versus* other interests, especially Technical, Business Operations, and Business Contact.

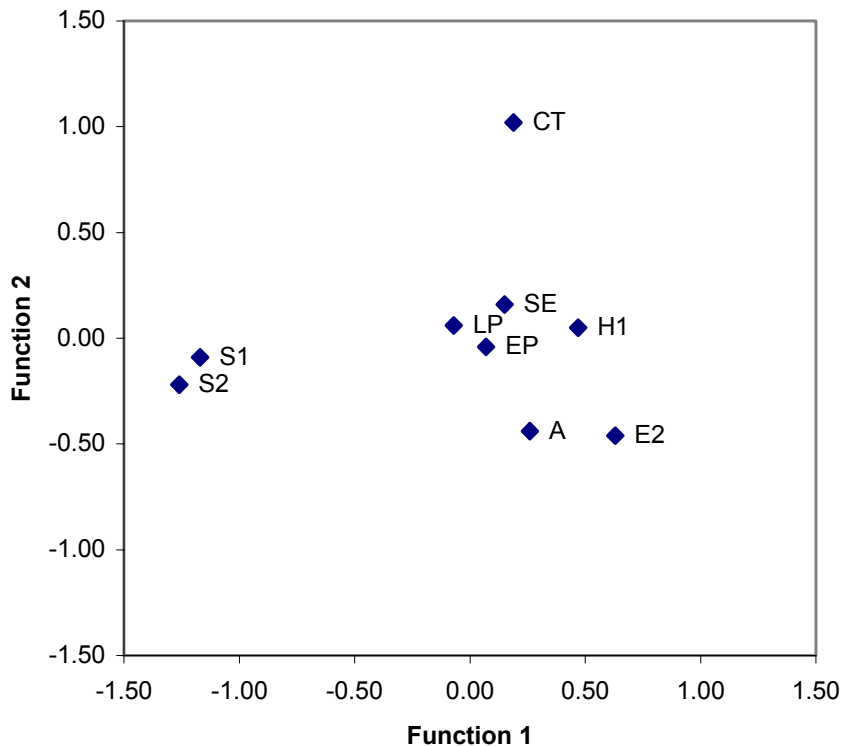
**Table 12**

***Interest Scale Standardized Coefficients on the Two Discriminant Function Factors***

Interest scale	Discriminant function factor	
	1	2
Science	-.74	-.62
Technical	-.32	.51
Business Operations	-.12	.23
Business Contact	.45	.39
Social Service	.02	-.03
Arts	.76	-.63

Plots of the factor-score means (centroids) on the first two discriminant function factors are presented in Figure 1. The first factor, defined as interest in arts *versus* science (Table 12), clearly differentiates secondary science teachers from all other teachers, especially secondary teachers in the humanities. This outcome is consistent with the concept of trait matching. In this regard, it is noteworthy that teachers of science not only hold strong interests in science, they also tend to *reject* interests in the humanities (see Emmerich & Trapani, 2002). This polarity, reminiscent of

the “two cultures” of C. P. Snow (1967; see also Lubinski & Benbow, 2000; Schmidt et al., 1998), appears to be especially salient for trait matching among teachers of science. The second factor, defined as interest in arts *and* sciences (Table 12), most clearly differentiates Career/Technical teachers from all other teachers, especially secondary school teachers for whom subject matter in the humanities and/or sciences is paramount. Because technical education is commonly distinguished from education in the arts and sciences, this outcome also is consistent with the concept of trait matching. For Early Primary, Late Primary, and Special Education teachers, highly specialized knowledge of the arts and/or sciences are expected to be less salient for the trait-matching process. That this is so is seen in the near-zero locations of these teaching specialties on both dimensions of Figure 1 (see also Emmerich & Trapani, 2002).



*Note.* EP = Early Primary, LP = Late Primary; S1 = Science 1; S2 = Science 2; E2 = English 2; A = Art; H1 = History 1; SE = Special Education; CT = Career/Tech.

**Figure 1. Plot of teaching specialty interest factor score means on the two discriminant function factors.**

### ***Five-Factor Model***

*Discriminant function analysis.* The 10 teaching specialties included in this analysis are listed in Table 3. In the overall multivariate test of the discriminant functions for the FFM,  $\Lambda = .93$ ,  $F = 4.62$ ,  $df = 45, 11, 889$ ,  $p < .001$ . The first two discriminant functions account for 76% of the between-group variance and the canonical correlations are .20 and .12, respectively.

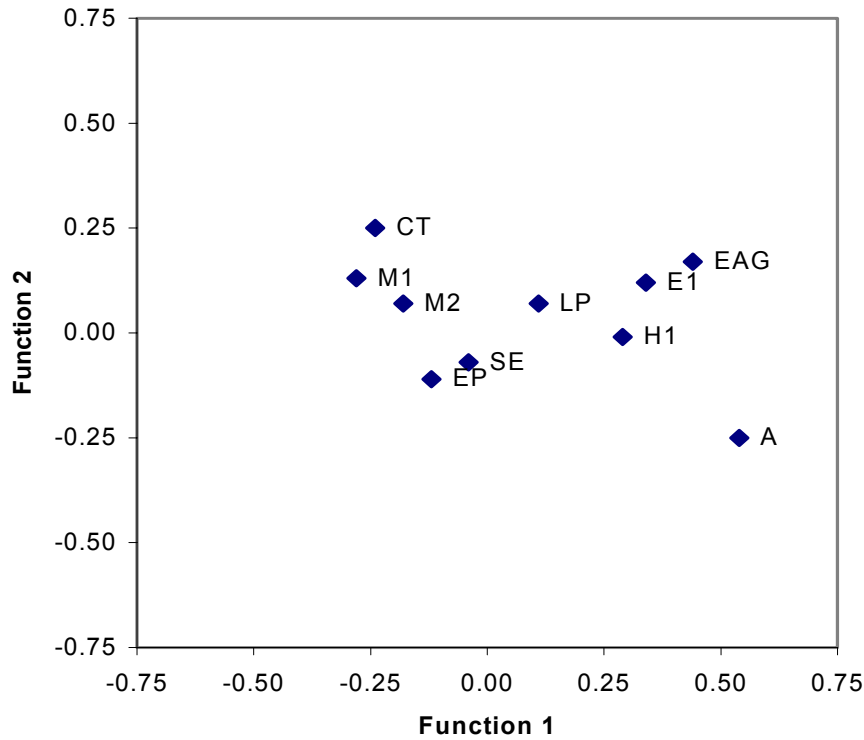
Standardized coefficients for each of the first two discriminant functions are presented in Table 13. For the first factor the major definer is Openness, and for the second the definers are Extraversion and Conscientiousness at one pole, and Agreeableness at the opposite pole. Although the meaning of the second factor is not entirely transparent, it appears to contrast “firm” leadership qualities, such as assertiveness and orderliness, with “soft” leadership qualities, such as friendliness and supportiveness.

**Table 13**

***FFM Dimension Scale Standardized Coefficients on the Two Discriminant Function Factors***

FFM dimension	Discriminant function factor	
	1	2
Extraversion	.42	.69
Agreeableness	-.24	-.69
Conscientiousness	-.17	.72
Neuroticism	.17	-.12
Openness	.94	-.20

Teaching specialty factor-score means on the first two discriminant function factors are presented in Figure 2. The first factor, defined as Openness, is most characteristic of teaching specialties in the humanities. The second factor, tentatively defined as firm versus soft leadership, most clearly differentiates Career/Technical teachers from Art teachers. Again, these differentiations are consistent with the concept of trait matching. These findings provide evidence that, in addition to interests, the FFM contributes to trait matching in occupational selection.



*Note.* EP = Early Primary; LP = Late Primary; EAG = Early Adolescent Generalist; M1 = Math 1; M2 = Math 2; E1 = English 1; A = Art; H1 = History 1; SE = Special Education; CT = Career/Tech.

**Figure 2. Plot of teaching specialty FFM factor score means on the two discriminant function factors.**

### ***Attributions***

*Discriminant function analysis.* The nine teaching specialties included in this analysis are listed in Table 3. In the overall multivariate test of the discriminant functions for the AIT-S item types,  $\Lambda = .81$ ,  $F = 5.88$ ,  $df = 64, 10,250$ ,  $p < .001$ . The first two discriminant functions account for 87% of the between-group variance and the canonical correlations are .38 and .15, respectively.

Table 14 presents standardized coefficients for each of the first two discriminant functions. For the first factor the major definer is internal locus in response to the positive teaching event

(PISCH and especially PIUCH). Note that for both of these item types controllability is fully yoked with high self-enhancement. For the second discriminant function factor the major definer is stability in response to the negative event, especially when combined with internal locus (NISUL). Although both of these stability item types (NISUL and NESUH) are characterized by uncontrollability, they differ with regard to self-enhancement, largely neutralizing the latter's effect as a definer. For the second factor, then, the major definer is lack of control in response to the negative classroom event.

**Table 14**

*AIT-S Item Type Standardized Coefficients on the Two Discriminant Function Factors*

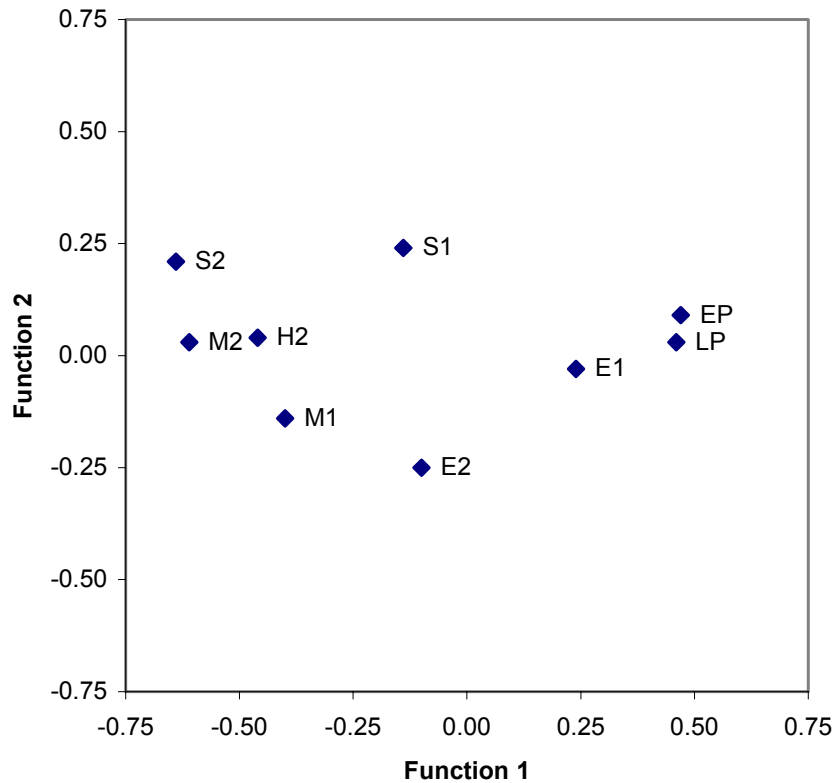
AIT-S item type	Discriminant function factor	
	1	2
PISCH	.52	-.39
PIUCH	.82	-.02
PES?L	-.28	-.15
PEUUL	-.20	-.14
NISUL	.21	.72
NIUC?	.22	.16
NESUH	-.29	.49
NEU?L	.19	-.06

*Note.* See Table 5 for the item type code definitions.

Teaching specialty factor-score means on the first two discriminant function factors are presented in Figure 3. The first factor differentiates quite consistently between primary and secondary school teachers, especially high school teachers of math and science. This pattern indicates that compared to secondary school teachers, primary school teachers experience greater sense of control and/or more self-enhancement in response to a positive classroom event, with middle school teachers falling between the primary and high school levels. The second factor differentiates primarily between secondary school science teachers and high school teachers of English. Because the positive pole of this factor signifies lack of control in response to a negative classroom event, this pattern suggests that compared to other secondary school teachers (especially high school teachers of English), teachers of science experience relatively low sense of control in response to a negative classroom event.



These findings on attributions can be summarized as follows: (a) Attributions contribute to personality differences among teaching specialties on two dimensions. (b) Each of the two dimensions is interpretable in terms of the valence of the classroom event interacting with locus, stability and/or controllability. (c) Attributions differentiate among teaching specialties along two axes, one involving grade level (extending from primary to high school), and the other based on subject matter taught within secondary teaching. (d) In response to a positive event, internality (ability, effort) is more characteristic of primary than of secondary school teachers. (e) In response to a negative event, external stable attributions signifying lack of control are more characteristic of secondary school science teachers (both Science 1 and 2) than of other teachers, especially secondary school teachers of English.



*Note.* EP = Early Primary; LP = Late Primary; S1 = Science 1; S2 = Science 2; M1 = Math 1; M2 = Math 2; E1 = English 1; E2 = English 2; H2 = History 2.

**Figure 3. Plot of teaching specialty attribution factor score means on the two discriminant function factors.**

### ***Axes of Differentiation Among Occupational Specialties***

*Multiple axes.* The above findings link certain personality characteristics (defined by the discriminant function factors) with each of several axes of differentiation among teaching specialties (defined by the patterns of factor-score means). Specifically, those discriminant functions with significant canonical correlations above .30 yielded three axes of differentiation: (a) secondary school teachers of science *versus* teachers in the humanities, differentiated on the basis of certain combinations of interests, (b) Career/Technical *versus* other teaching specialties, differentiated on the basis of a different combination of interests, and (c) primary school teachers *versus* secondary school teachers, differentiated on the basis of a certain pattern of attributions. Interestingly, the remaining (weaker) discriminant functions can also be mapped onto these axes of differentiation. The first FFM factor bears on the science *versus* humanities axis, as does the second attribution factor, and the second factor for the FFM bears on the Career/Technical *versus* other teachers axis.

*Supplementary analyses.* Regrouping the above findings, we can see that each of the three personality domains has differential relevance to the three axes of differentiation. Specifically, the interest domain has particular relevance to the science *versus* humanities distinction and to the Career/Technical *versus* other distinction (Figure 1). The FFM is particularly relevant to the latter as well as to a variant of the former (involving math rather than science at one pole; Figure 2), and attributions are particularly relevant to the primary *versus* secondary school distinction and to the science *versus* humanities distinction (Figure 3). It is noteworthy that this coherent picture emerged despite incomplete overlap in the specific teaching specialties included in the separate domain analyses.

These considerations suggest the importance of including multiple personality domains in studies of factors influencing occupational choice (Borgen, 1999). To further illustrate this point, supplemental discriminant analyses were conducted. Interests and attributions were both measured in the four teaching specialties listed in Table 4. Using these specialties, a discriminant function analysis that includes both of these domains would be expected to yield incremental differentiating power, and to do so coherently along the axes of differentiation identified earlier. A baseline for interests alone was established by running the discriminant functions on the six interest measures for the four teaching specialties. In the overall test of the discriminant functions  $\Lambda = .55$ ,  $F = 33.73$ ,  $df = 18, 2,606$ ,  $p < .001$ . The first two discriminant functions account for 98% of the between-group

variance, and the canonical correlations are .62 and .28, respectively. Similarly, a baseline for attributions alone was established by running the discriminant functions on the eight AIT-S item types. In the overall test of the discriminant functions  $\Lambda = .82$ ,  $F = 7.73$ ,  $df = 24$ ,  $2,654$ ,  $p < .001$ . The first two discriminant functions account for 96% of the between-group variance, and the canonical correlations are .37 and .19, respectively. The multidomain analysis includes the six interest scales *and* the eight AIT-S item types. In the overall test of the discriminant functions  $\Lambda = .47$ ,  $F = 18.58$ ,  $df = 42$ ,  $2,692$ ,  $p < .001$ . The first two discriminant functions account for 97% of the between-group variance, and the canonical correlations are .64 and .42, respectively. In this illustration, then, inclusion of the two personality domains adds some discrimination power (primarily to the second factor) compared to interests alone. The key to such potential gains, we suggest, is that multidimensionality exists on *both sides* of the equation: multiple personality domains conjoined with multiple axes of differentiation. The supplementary analysis also preserves and integrates earlier findings in which interests (Table 12 and Figure 1) and attributions (Table 14 and Figure 3) were analyzed separately based on larger numbers of teaching specialties. Specifically, the first discriminant function factor is defined once again as interest in Arts (humanities) *versus* Science (Table 12), and this factor sharply differentiates the two science teaching specialties from the other teaching specialties. The second factor integrates the earlier second factor for interests, interest in the arts *and* sciences *versus* other interests (Table 12), with the earlier first factor for attributions, internal locus in response to the positive teaching event (Table 14), and this factor differentiates between primary and secondary school teachers.

## **Results: Personality in Relation to Teaching Performance**

### ***Impact of Years of Teaching Experience***

Preliminary multiple regression analyses were conducted separately by personality domain to determine whether inclusion of YTE as a covariate would alter associations between the personality measures and teaching performance (NBPTS scores). For interests and attributions, YTE did not contribute significantly to the  $R$  nor did YTE basically alter the contributions of each scale to the  $R$ . For the FFM, YTE did not contribute significantly to the  $R$  in 9 of the 10 teaching specialties, nor did YTE basically alter the contributions of each of the FFM scales to the  $R$ .<sup>11</sup> Overall, then, controlling for YTE did not substantially alter the relationships found between the personality measures and quality of teaching.

### ***Interests (UNIACT)***

*Relationships with NBPTS performance.* Correlations between the six UNIACT interest scales and teaching performance (NBPTS total scores) are presented in Table 15. As seen in Table 15, teaching performance is generally unrelated to four of the interest scales (Science, Technical, Social Service, and Arts), but is related (negatively) with some consistency to the two business scales, especially Business Operations. Not surprisingly, Career/Technical teachers, for whom business interests are highly compatible with the curriculum, were among the several teaching specialties for which these two negative relationships did not hold.

**Table 15**

***Summary of Relationships Between Interests and Teaching Performance  
(NBPTS Scores)***

Interest scale	$r^a$	Range
Science	.01 <sup>0</sup>	-.11 – .06
Technical	-.07 <sup>1</sup>	-.22 – .05
Business operations	-.14 <sup>5</sup>	-.29 – .03
Business contact	-.13 <sup>4</sup>	-.30 – .01
Social service	-.03 <sup>0</sup>	-.15 – .09
Arts	.05 <sup>0</sup>	-.08 – .19

<sup>a</sup> Median correlation across the nine teaching specialties (see Table 3 for the sample *Ns*). Superscripts indicate the number of teaching specialties (maximum of nine) for which the correlation is significant ( $p < .05$ ).

*Comparisons between phases.* The primary purpose of this study is to determine whether among established teachers personality impacts differently on occupational choice, called Phase 1, and occupational performance, here considered to be an aspect of Phase 2. The between-specialty discriminant function analyses are assumed to yield evidence for trait matching occurring during Phase 1, whereas the within-specialty correlations between the personality measures and the NBPTS measures serve as indicators of personality-performance relationships. For the interest domain, comparison of the between-group findings (reported earlier) with the within-specialty findings reveals that personality measures of functional importance during Phase 1 differ from personality measures of functional importance during Phase 2. Specifically, interest in science and/or the arts define the two discriminant function factors (Table 12), whereas the two business

interests relate most consistently (negatively) with teaching performance (Table 15). This disjunction indicates that interests function quite differently in relation to occupational choice and occupational performance, at least among established teachers.

***Five-Factor Model***

*Relationships with NBPTS performance.* Correlations between the FFM scales and teaching performance (NBPTS total scores) are presented in Table 16. As seen in Table 16, the FFM dimensions exhibit few relationships with quality of teaching across the 10 teaching specialties. Curiously, these outcomes are counterintuitive and largely inconsistent with past research on the FFM (Barrick, Mitchell, & Stewart, 2003; Schmidt & Hunter, 2004). Most striking, Conscientiousness is *unrelated* to quality of teaching within *all 10* teaching specialties. Also, quality of teaching is associated *negatively* with Agreeableness (in three teaching specialties) and *positively* with Neuroticism (in two teaching specialties).

**Table 16**

***Summary of Relationships Between the FFM Scales and Teaching Performance (NBPTS Scores)***

FFM dimension	$r^a$	Range
Extraversion	.00 <sup>1</sup>	-.23 – .16
Agreeableness	-.09 <sup>3</sup>	-.29 – -.03
Conscientiousness	.01 <sup>0</sup>	-.06 – .23
Neuroticism	.05 <sup>2</sup>	-.16 – .22
Openness	.03 <sup>1</sup>	-.04 – .18

<sup>a</sup> Median correlation across the ten teaching specialties (see Table 3 for the sample *Ns*). Superscripts indicate the number of teaching specialties (maximum of 10) for which the correlation is significant ( $p < .05$ ).

Regarding Agreeableness, evidence reported earlier hinted that this FFM dimension may reflect a “soft” leadership style (Table 13). Reminiscent of the views of Baumrind (1989) on effective parenting, this leadership style, whether in relation to individual students, classroom management, and/or contacts with parents or the community, could be construed by NBPTS assessors as a weakness, resulting in lowered NBPTS scores. If so, then a negative relationship between Agreeableness and teaching performance becomes plausible. In this regard, each of the

five FFM dimensions is a composite of several subscores, most of which are designated as facet scores, with each facet score based on at least three items from the Air Force Self-description Inventory. Because each facet measures a somewhat distinctive aspect of personality, the facets that constitute a given FFM dimension need not all relate similarly to a criterion external to the FFM domain. Indeed, this possibility has led researchers to recommend selection of relevant personality characteristics at the facet level when relating the FFM to occupation-relevant criteria (Hough & Ones, 2001; Johnson, 2003; Mount et al., 2003; Paunonen & Ashton, 2001).

As it happens, “assertiveness” is one of the facets for Extraversion included in the Air Force Self-description Inventory. Although Extraversion as a *dimension* is generally unrelated to NBPTS performance (Table 16), the possible contrast between a firm and soft leadership style (Table 13) raises the possibility that the relationship between assertiveness and teaching performance is positive. This expectation receives modest support, as seen by comparing findings for the assertiveness facet in Table 17 with those for its superordinate dimension, Extraversion, in Table 16.

**Table 17**  
***Summary of Relationships Between Two FFM Facet Scores and Teaching Performance (NBPTS Scores)***

Facet score	$r^a$	Range
Assertiveness	.11 <sup>4</sup>	-.03 – .26
Envy-Jealousy	.12 <sup>4</sup>	-.13 – .19

<sup>a</sup> Median correlation across the 10 teaching specialties (see Table 3 for the sample *Ns*). Superscripts indicate the number of teaching specialties (maximum of 10) for which the correlation is significant ( $p < .05$ ).

Regarding Neuroticism, when this dimension is decomposed into its facets, the facet called “envious and jealous” turns out to be the most consistent “carrier” of the modest positive relationship found between Neuroticism and quality of teaching (see Table 17). Because envy/jealousy implies social comparison and perhaps competitiveness, this facet measures a possible motivator of teaching excellence. In contrast, the remaining Neuroticism facets (“nervous and stressed-out,” “worrying,” “irritable”) appear less likely to serve as effective motivators of

teaching performance. Supportive of this view, the latter three facets each relates significantly ( $p < .05$ ) to teaching performance in only one of the 10 teaching specialties.

*Comparisons between phases.* Regarding the discriminant function analyses (Phase 1), Openness is the major definer of the first factor (Table 13). Regarding personality-performance relationships (Phase 2), however, Openness is largely unrelated to teaching performance (Table 16). Similar to interests, then, the strongest personality influence for occupational selection has little functional importance for effective teaching. Yet the second (weaker) discriminant function factor for the FFM, which appears to contrast firm and soft leadership styles (Table 13), does have at least a detectable impact on both occupational choice (Phase 1) and occupational performance (Phase 2).

### ***Attributions (AIT-S)***

*Relationships with NBPTS performance.* Correlations between the eight AIT-S item types and teaching performance (NBPTS total scores) are presented in Table 18. A relatively high score on the NESUH item type signifies a tendency to attribute problematic teaching to external stable factors beyond the teacher's control. In this regard, the NESUH item type relates most consistently (negatively) to teacher performance. Because this is the only AIT-S item type for which *lack* of control is unambiguously combined with *high* self-enhancement, we can infer that controllability in relation to the negative event, not self-enhancement, is the relevant dimension linking attributions to quality of teaching. The NIUC? item type exhibited a weaker trend, in this case relating *positively* to teaching quality, which is unique among the four item types for the negative situation, probably because the NIUC? item type is distinctive (among the four) in implying that the teacher would be able to overcome the problem through effort.

*Comparisons between phases.* For attributions, the first discriminant function factor is defined largely by internal locus in response to the positive teaching event, involving PISCH and especially the PIUCH item type (Table 14). These outcomes bear on occupational selection, although an alternative interpretation may also be plausible (see Discussion). Yet these two item types do not relate consistently to NBPTS scores (Table 18), suggesting that internal locus in response to a positive teaching event is more salient for trait matching in occupational selection (Phase 1) than for quality of teaching performance (Phase 2). For the most part, then, attributions appear to function quite differently in relation to occupational choice than in relation to occupational performance, at least among established teachers. Yet not entirely. The second

discriminant function factor for attributions is defined primarily as stability (and controllability) in relation to a negative classroom event (Table 14), and one of the item types defining this factor (NESUH) relates (negatively) to performance with some consistency (Table 18). As in the case of the FFM, then, we see a mixed picture in which the stronger influence on occupational selection (Phase 1) is largely nonfunctional in relation to teaching performance (Phase 2), whereas the weaker influence has at least a detectable impact during both phases.

**Table 18**  
***Summary of Relationships Between the AIT-S Item Types and Teaching Performance (NBPTS Scores)***

Item type	$r^a$	Range
PISCH	-.04 <sup>1</sup>	-.14 – .08
PIUCH	.03 <sup>2</sup>	-.05 – .13
PES?L	-.08 <sup>1</sup>	-.13 – .11
PEUUL	-.12 <sup>2</sup>	-.18 – .12
NISUL	-.05 <sup>2</sup>	-.20 – .10
NIUC?	.07 <sup>3</sup>	-.01 – .25
NESUH	-.16 <sup>5</sup>	-.19 – .03
NEU?H	-.02 <sup>2</sup>	-.22 – .18

*Note.* See Table 5 for the item type code definitions.

<sup>a</sup> Median correlation across the nine teaching specialties (see Table 3 for the sample *Ns*). Superscripts indicate the number of teaching specialties (maximum of nine) for which the correlation is significant ( $p < .05$ ).

## Discussion

### ***Dual Functions of Personality***

Regarding the major question addressed in this study, those personality characteristics that differentiated most sharply among teaching specialties were largely *unrelated* to quality of teaching within the specialties. This was the case for interests in the arts and/or sciences, Openness to Experience, and internal attributions (ability and effort) in response to a positive teaching event. Though limited, there was also evidence for some overlap in the functions served by personality. For the FFM, signs of a firm leadership style both distinguished Career/Technical teachers from those in other teaching specialties and related positively to teaching performance with some



consistency. For attributions, perceived uncontrollability in relation to the negative classroom event both distinguished secondary science teachers from other teachers and related negatively to performance with some consistency. Nonetheless, those personality characteristics contributing most to occupational selection were of little functional significance for performance, consistent with other evidence suggesting that fit between personality and chosen work setting cannot be relied on as an indicator of effective performance (Ryan & Kristof-Brown, 2003; Schneider et al., 2000; Waller et al., 1995). This state-of-affairs for personality measures is in sharp contrast to general mental ability, which distinguishes both *between* the incumbents of different occupations and individual differences in occupational performance *within* classifications (Schmidt & Hunter, 2004).

Three axes of personality differentiation among teaching specialties were identified: (a) science (or math) *versus* the humanities, (b) career/technical *versus* other teaching specialties, and (c) primary education *versus* secondary education. Of particular importance, these axes partitioned teaching specialties coherently in terms of their respective curricular and training requirements. This linkage between personality and natural structural divisions within education points to the ecological validity of the personality domains under investigation. In addition, all six of the discriminant function factors bear on the three identified axes, suggesting that, as a set, the three are quite comprehensive for the teaching profession. Also, the three personality domains are *differentially relevant* to the three axes of differentiation, suggesting that inclusion of multiple personality domains would enhance incremental validity in studies of occupation selection in particular and niche selection in general. A supplemental analysis that included both interests and attributions provided modest initial support for this conjecture.

These axes of personality differentiation are specific to the teaching profession. Yet their coherence and ecological validity in relation to teaching have broader implications. Invoking the concept of trait matching, these findings support a particular strategy for investigating the psychology of situations (Barrick, Mitchell, & Stewart, 2003; Funder, 2001; Ickes et al., 1997; Magnusson, 1981; Pervin, 1981). In this strategy each of several personality characteristics would be studied in relation to the trait-matching process as individuals decide whether or not to enter each of a number of situations. If the array of situations were to be orderable along multiple axes, and if these axes were to be systematic from the standpoint of tasks and demands (Barrick,

Mitchell, & Steward; Hough, 2003; Ickes et al.), then a taxonomy of situations grounded in personality might be constructed. The important related question of how individuals respond to a situation, once entered, also could be addressed, perhaps in terms of individualized behavioral profiles (Mischel & Shoda, 1999).

The remainder of the discussion elaborates on these and related findings, considers further implications for theory and research, and offers several caveats.

### ***Five-Factor Model***

In support of the dual-function thesis, Openness differentiated teachers of the humanities from other teachers, but Openness did not relate consistently to quality of teaching. Also, Neuroticism at the dimension level contributed little to occupation selection, but one of its facets, envy-jealousy, tended to enhance quality of teaching, perhaps due to social comparison, competitiveness, and/or status-seeking as motivating factors. Assertiveness, a facet of Extraversion suggesting firm leadership, also was more likely than Extraversion (as a broad trait) to yield meaningful and generalizable relationships with quality of teaching. These two outcomes involving FFM facets are consistent with the view that the facets are more likely than the five broader factors to be predictive of performance outcomes (Borman et al., 1997; Hough, 2003; Hough & Schneider, 1996, Murphy, 1996; Hogan, Hogan, et al., 1996; Paunonen, 1998; Paunonen & Ashton, 2001). Indeed, a number of writers have emphasized the heuristic value of a multilevel hierarchical approach to personality (Carroll, 2002; Coan, 1964; Costa & McCrae, 1995; Digman, 1997; Emmerich, 1968; Hough & Schneider, 1996; John, 1990; John & Srivastava, 1999; Saucier & Goldberg, 2003). An important implication of this view is that measurement at different levels of the FFM hierarchy can help systematize relationships between the FFM and other domains (Hough & Ones, 2001; Mount et al., 2003; Johnson, 2003). In this regard, relationships found here between the FFM and attributions were interpretable at the *highest* (superfactor) level of the FFM hierarchy (Table 11), whereas Openness contributed to occupational selection at a lower level of the hierarchy, namely the five-factor level. Personality-performance relationships, however, appeared to entail specific motivational-dynamic factors bearing on adaptive responses in the work context, probably located at even lower levels of the personality hierarchy. Implications of this interpretation for interests and attributions are considered later in the discussion.

## ***Interests***

*Dual role.* Results for interests provided especially compelling evidence for the dual role played by personality. The first and second discriminant functions for interests were both of moderate magnitude, and each was defined primarily (and plausibly) in terms of the Science and Arts interest scales (Table 12 and Figure 1). These outcomes point to the likely salience of trait matching at the time of occupational choice. However, neither the Science nor Arts interest scale related to quality of teaching (Table 15). Considered alone, the latter findings are counterintuitive, as interest in the arts and sciences goes to the heart of teaching, especially at the secondary school level. Yet when the two sets of findings are considered together, it is clear that interest in science and the arts *did* contribute substantially to an occupation-relevant outcome, namely specialty selection. And, although interest in business contributed little to choice of teaching specialty within the arts and sciences (Table 12), interest in business related (negatively) to quality of teaching with some consistency (Table 15).

*Business interests and performance.* But why do relatively strong business interests detract from or interfere with quality of teaching? Perhaps the initial trait matching process was incomplete or misguided for some participants. In this regard, residual negative effects on performance could occur among practicing teachers who had switched into teaching after holding jobs in business or after studying to prepare for a business career (R. Feldman, personal communication, December 2001). Also, some established teachers may become distracted or conflicted by the prospects of increased earnings and/or more favorable working conditions in the world of business. Others may aspire to business-related (and higher-paying) administrative positions in the schools, detracting from (or due to) their performance as teachers. These and perhaps other possible explanations remain to be pinned down in research.

*Possible interest hierarchies.* Relationships among interests generally conformed to Holland's circular model across teaching specialties (Table 6). Although well established for the general population, the presence of this circular structure *within the subspecialties* of a profession is noteworthy, both for theory building and applications to guidance and counseling. From a conceptual standpoint, as specialties or subspecialties become increasingly differentiated from one another on a particular characteristic, individual differences within those groupings might be expected to decrease on that characteristic, roughly analogous to processes of speciation in evolution. At some point this decrease of within-group variability would begin to diminish the

potential for the characteristic to relate to anything else. In the present case, the circular structure of interests would be degraded or lost. Perhaps this did not happen because differentiation among teaching specialties on the basis of interests did not reach the critical threshold postulated by this interpretation.

Arguably, though, stronger evidence for attenuation of the circular ordering might have been expected in the present study. Perhaps a countervailing factor might have been operating. In this regard, Abbott (2001) has suggested that certain behavioral patterns tend to repeat themselves from one level to the next within a naturally occurring hierarchy. As an illustration, Abbott portrays a situation in which people differing sharply in their views on an issue split off into two opposing and homogeneous camps on the issue. In Abbott's view, however—and this is the interesting point—individual differences on the same issue will emerge within each of the two groups. Analogously, teaching specialties that are differentiated in their personality characteristics could, nonetheless, foster individual differences on the same personality characteristics, thereby reiterating the original structure. Other examples from the occupational realm quickly come to mind, such as possible differences in personality between attorneys who specialize in litigation versus those who do not, and between physicians who specialize in public health versus those who specialize in surgery. Consistent with Abbott's analysis, then, present findings suggest the possibility that the circular structure of interests tends to be replicated (with some modification) as one moves down the hierarchy of occupational classifications from broad classifications to successively narrower subspecialties.

Given that the circular structure of interests was largely maintained within teaching specialties, why would those interests that are most salient for teaching in the arts and sciences (Science, Arts, Social Service) *fail* to relate (positively) to quality of teaching? One possible explanation takes into account the degree of specificity of the stated interest. In this regard, UNIACT interest items clearly measure personality at a broad level, as these items include little contextual information and rarely refer to teaching activities as such (Hogan & Blake, 1996; Rounds, 1995; Swaney, 1995). Similar to the earlier suggestion for the FFM, then, perhaps broad measures of interests in social service, arts, and sciences are of importance for trait matching in choosing teaching as an occupation, yet too broad to bear on subsequent effectiveness as a teacher. On the other hand, if such measures were to be contextualized in terms of the specifics of the

teacher's role, then perhaps they would yield relationships with quality of teaching not found here for the UNIACT.

### ***Attributions***

*Externalization of blame.* Some teachers tended to explain a problematic teaching situation in terms of external stable factors, a tendency that was modestly associated with relatively low teaching quality with some consistency. The crucial feature here appears to be externalization of blame, with blame directed primarily to uncontrollable factors. A tendency to externalize blame in response to problematic teaching situations probably would become apparent to evaluators during the course of the NBPTS assessments, resulting in relatively low NBPTS scores. Consistent with this inference, structural findings suggested that external locus defines a relatively broad personality tendency, generalizing across positive and negative events (Table 9).

*Whither the bipolarity assumption?* If the bipolarity assumption holds, relationships between opposite poles of a causal dimension should be negative (Hewstone, 1989). In the present study, however, negative correlations between the two poles of a dimension (e.g., internal vs. external locus) generally were absent, casting doubt on the necessity of using bipolar scales (see Table 9). Importantly, this situation did *not* result in substantive findings that were contrary to attribution theory. Indeed, the AIT-S unipolar scales yielded normative findings that were highly consistent with attribution theory. In addition, the unipolar AIT-S measures entered into meaningful relationships with other study measures in the preliminary cross-domain analyses, the discriminant function analyses, and the correlations with quality of teaching. These findings were consistent with our expectation that, for purposes of measurement, the bipolarity assumption could be relaxed safely and even productively without undermining the major tenets of attribution theory.

*The question of hierarchy.* To the best of our knowledge, the question of whether attributions at different levels of specificity form a hierarchical structure has not been addressed systematically in research. Other than raising the possibility of such a structure, findings from the present study shed little light on this matter (for attributions) because the AIT-S measures are limited to the teaching context. What *is* clear is that the eight item types of the AIT-S do not themselves form a simple hierarchical structure (Table 9). Yet this outcome does not tell us whether and how the same eight item types applied to a life context *other than work* (teaching) would relate to the AIT-S measures. Such information would be required in order to test the

present hypothesis that measures higher in a personality hierarchy would more likely be engaged during trait matching, whereas measures lower in the hierarchy would be engaged primarily when adapting to work demands.

### ***Stability Versus Systematic Change***

Treated as a covariate, the number of years of teaching experience had little effect on the discriminant functions and did not substantially alter relationships between personality and quality of teaching. Thus, present evidence on occupation-related outcomes in relation to personality appears to be robust despite possible changes in personality during adulthood, cohort differences, and/or selective attrition from the teaching profession. Yet the possibility remains that personality becomes increasingly differentiated during the interval between entry into teacher training and attainment of three years of teaching experience. Such differentiations could be the result of specialty-specific teacher training and/or the first few years of experience as a practicing teacher. In this regard, it is important to note that responses to self-report personality inventories may reflect the respondent's self-presentational style (Johnson, 1997) and/or identity (Hogan, 1996; Hogan & Blake, 1996; Hogan & Holland, 2003). Such characteristics could change systematically during the interval under discussion, either as a result of personal growth (Lubinski & Benbow, 2000; Wurf & Markus, 1991), environmental influences (Feldman, Ethington, & Smart, 2001), or some combination. These possibilities may be of particular importance in explaining present findings on attributions. Specifically, compared to high school teachers, primary school teachers may be especially likely to attribute a positive teaching event to internal factors because they typically face fewer obstacles in accomplishing their goals as teachers. In addition, teacher attrition during training and/or during the first few years of teaching could accentuate personality differences among teaching specialties. Further research is needed to determine whether incremental trait matching occurs during this interval, and, if so, why.

### ***Possible Implications for Constellation Theories***

This study bears a resemblance to attempts to identify trait complexes or constellations (Ackerman, 1999; Ackerman, Bowen, Beier, & Kanfer, 2001; Ackerman & Heggestad, 1997; Borman et al., 1997; Lubinski, 2000; Lubinski & Benbow, 2000; Prediger, 1999; Reeve & Hakel, 2000; Snow, Corno, & Jackson, 1996). Unlike research on trait constellations, however, this study did not include measures of abilities and knowledge that were separate from the NBPTS

assessments themselves.<sup>12</sup> Also, constellation theories have given greater attention to the impact of trait constellations on occupational selection, satisfaction, and persistence than on personality-performance relationships per se. For these reasons, any comment on the implications of present findings for constellation theories must remain highly tentative.

With this caveat in mind, present findings that bear on occupation selection appear to be consistent with constellation theories. In this regard, constellation theorists have emphasized how one's psychological investment in an area of knowledge (and related cognitive skills) results in integrations of these abilities with certain personality characteristics (Ackerman, 1999; Lubinski, 2000). Trait matching, emphasized in this study, may well be an important aspect of the investment process postulated by constellation theories. Present evidence also suggests that occupational selection through trait matching tends to engage relatively broad tendencies in a personality hierarchy, whereas the motivational-dynamic factors influencing performance tend to be located at lower levels of the hierarchy. Because the latter are less a matter of trait matching than adaptation to a work context, the concept of investment may turn out to be more applicable to such outcomes as occupational selection, satisfaction, and persistence than to personality-performance relationships, especially among experienced workers.

### ***Self-enhancement, Self-esteem, and Happiness***

In a recent review of research on self-esteem, Baumeister, Campbell, Krueger, and Vohs (2003) concluded that self-esteem is an important personality characteristic, but minimally related to measures of academic achievement and work performance. Present findings are consistent with these conclusions. Self-enhancement, a close variant of self-esteem, was a defining dimension within the scheme used here to code the attribution item types. Preliminary analyses further documented that the tendency to explain a positive teaching event in terms of internal locus clearly reflects self-enhancement or self-esteem. Two item types were involved, one signifying ability and the other signifying effort. Evidence of the *distinctiveness* and *salience* of this pair of item types (in relation to the other attribution item types) was striking. Specifically, the correlation between these two item types was quite high (Table 9), the two were largely orthogonal to the other attribution item types (Table 9), and these were the only item types to be highly endorsed (in absolute terms) as causal explanations (Table 8). Also, this pair of item types tended to be associated with interests signifying active leadership qualities (Table 10), presumably important for self-esteem in teaching. Moreover, this pair of items was positively associated with the FFM

superfactor signifying positive self-esteem (Table 11) (see Robins et al., 2001). These findings make clear that self-esteem plays a distinctive and salient role in the lives of practicing teachers. Yet the same two attribution item types generally *failed* to relate consistently to quality of teaching (Table 18). Consistent with the claim of Baumeister et al., then, whatever role self-esteem plays for established teachers, that role has little bearing on the quality of their performance as teachers.

In their review, Baumeister et al. (2003) also concluded that self-esteem relates moderately to happiness. We have seen that internal locus in response to the positive teaching event was a good proxy for a direct measure of self-esteem. We have also seen that the internal locus measures defined a moderately strong discrimination function factor, a factor that differentiated primary from secondary school teachers quite sharply. This pattern suggests that extent of happiness, not directly measured in this study, might also differentiate primary from secondary school teachers. Further research is needed to pin down whether the affective complex consisting of self-esteem, internal locus (in response to a positive event), and happiness contributes to occupational selection, is a result of occupational selection, or, as seems likely, works both ways.

### ***Happiness, Unhappiness, and Performance***

The conclusion that happiness is related to self-esteem, but that self-esteem is largely unrelated to performance (Baumeister et al., 2003) implies that work performance and happiness are unrelated. Yet other reviews suggest that work performance and happiness (satisfaction) *are* related under certain circumstances (Judge, Thoresen, Bono, & Patton, 2001; Lucas & Diener, 2003). How might the latter evidence be reconciled with present findings?

In answering this question, it is important to take a closer look at the nature of the NBPTS assessments used here as measures of teaching quality. Although the NBPTS assessments rely in part on school-based evidence, such as classroom videotapes, the NBPTS evaluates quality of teaching with little or no direct knowledge of the candidate's local reputation as a teacher. The discussion by Lucas and Diener (2003) implies that a teacher who displays happiness (satisfaction) on the job may, as result, receive elevated performance ratings, based on perceptions of good organizational citizenship (regardless of teaching skills). Hogan and Blake (1996) make a similar point when distinguishing between the task-relevant and social-evaluative components of outcome criteria. Because the NBPTS assessments are not designed to focus on the candidate's local reputation as a teacher, extent of candidate happiness could relate substantially to local evaluations of performance even though it does not relate to NBPTS scores.



In addition, Diener, Suh, Lucas, and Smith (1999) and Lucas and Diener (2003) suggest that happiness and unhappiness are at least partially independent attributes of personality (rather than opposites). In the present study self-esteem did not relate positively to teaching performance. Yet likely manifestations of occupational *unhappiness*, such as a strong interest in business (while serving in a nonbusiness profession) and a tendency to attribute blame to uncontrollable factors in a problematic teaching situation, tended to relate *negatively* to teaching performance. Although it is hardly surprising that relatively weak teaching may be accompanied by unhappiness, present findings highlight the point that this can happen without happiness showing the opposite effect. Further research is needed to verify that extent of dissatisfaction does relate (negatively) to performance, whereas extent of happiness, as a distinctive characteristic, does not relate positively to performance.

### ***Strengths, Limitations, and Prospects***

Extensive prior research had established the importance of interests in occupational choice. Present findings extend this tradition by providing systematic evidence on differences in interests among the incumbents of different *subspecialties* within a profession, specifically teaching. And, apart from interests, the FFM and attributions were shown here to contribute to occupational choice in plausible and heretofore undocumented ways. In this regard, it is worth noting that subjective judgments were used in this study to measure personality, but not occupational choice. For this reason, the moderate relationships between personality and occupational choice found here are not due to inflation arising from use of a shared self-report methodology.<sup>13</sup>

Regarding personality-performance relationships, effect sizes (correlations) were small, though not out of line with the magnitudes of relationships often found in field studies (Anderson & Bushman, 2002; Hemphill, 2003; Hogan & Blake, 1996; Hough & Schneider, 1996; Meyer et al., 2001). Yet effect size is only part of the story. Particular attention was given here to evaluating the consistency of an outcome across teaching specialties, a form of cross-validation. As in a meta-analysis, evidence for cross-validation can sharpen inferences, especially when effect sizes are small. In this regard, it is worth noting that relationships among measures within personality domains exhibited the most generalizability, relationships between personality and performance exhibited the least generalizability, and relationships across personality domains generally fell in between. This ordering appears to correspond to common-sense judgments on the “psychological distances” (content and/or process overlaps) among these three classes of variables.

Certain procedural enhancements, such as use of a longer form of the AIT-S (to enhance reliability), might yield stronger and/or more generalizable personality-performance relationships than those found here. For several reasons, however, it is doubtful that such enhancements would substantially alter the pattern of personality-performance relationships found in this study. Preliminary findings on construct validity were quite compelling, the NBPTS composite scores used here as indexes of teacher quality were moderately reliable, and several of the personality measures having relatively low reliability (AIT-S item types and FFM facet scores) nonetheless related meaningfully to teaching performance with some consistency.

Yet it bears emphasizing that participants in this study were all established teachers. Stronger and/or different personality-performance relationships might be found for teachers in transition between the two phases of occupational development emphasized in this study. This would include teachers in training, teachers who have college degrees but are not state-certified, and practicing teachers with fewer than three years of teaching experience. These remaining gaps in our understanding of the occupational development of teachers suggest the importance of research that considers teachers as they move from novice to expert status. Such an approach would measure systematic combinations of ability and knowledge, personality, satisfaction indexes, attrition, and performance at each of several data points.

Such studies would help sharpen, extend, and perhaps modify the conclusions of the present study. Particularly noteworthy is the absence here of evidence for a positive relationship between Conscientiousness and occupational performance, an anomalous outcome (Barrick, Mitchell, & Steward, 2003; Schmidt & Hunter, 2004). Perhaps the salience of Conscientiousness for performance was greatly attenuated in this study because participants were accomplished teachers who, in addition to performing their usual teaching duties, were willing to devote considerable time and effort to carrying out all 10 NBPTS exercises. Positive relationships between Conscientiousness and teaching performance appear more likely to hold for less experienced teachers, perhaps especially for teachers just starting teacher training.

As noted earlier, this study treated personality as an overarching concept encompassing overlapping but largely distinct domains. In this regard, preliminary findings on relationships among interests, the FFM, and attributions (Tables 7, 10, and 11) provided compelling evidence for limited convergence within a larger pattern of domain distinctiveness, at least among established teachers. In the case of interests in relation to the FFM (Table 7), the pattern observed

here was highly consistent with that found for other populations. Whether the same can be said for interests in relation to attributions, and for the FFM in relation to attributions, remains a question for further research. Research also is needed to verify present conjectures that each personality domain has its own hierarchical structure, and that the postulated dual functions of personality in relation to occupation-related criteria are likely to be engaged at different levels of personality hierarchies.

Conclusions drawn in this study are strengthened by the fact that present samples did not differ substantially from their respective teaching-specialty populations on official NBPTS pass rates and other relevant characteristics. Also, it is no great stretch to suggest that present conclusions probably apply to first-time candidates in other NBPTS cohorts. Nevertheless, caution should be exercised in generalizing the results of this study. Candidates for advanced certification by the NBPTS are volunteers, raising the possibility that the NBPTS population does not represent established teachers in general. Specifically, it remains unknown whether established teachers in the United States who never apply for advanced NBPTS certification would be similar to NBPTS candidates with regard to (a) relationships among the personality domains, (b) differences in personality among teaching specialties, and/or (c) relationships between the personality measures and quality of teaching. Also unknown is whether adding more teaching specialties to the present mix, or sampling them in different combinations, would alter present findings and conclusions.

For *some* established teachers in *some* teaching specialties, present evidence on generalizability of effects suggests that the psychological, social, and/or financial costs of certain personality characteristics are substantial enough to warrant preventive or ameliorative efforts. For example, high school and/or college counselors might be in a position to provide corrective feedback on the choice of one or another teaching specialty. Such feedback appears to be especially warranted with regard to aspects of personality found here to *interfere* with quality of teaching, such as a strong interest in business and externalization of blame when confronted with a problematic teaching situation.

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## Notes

- <sup>1</sup> Personality is taken here to be an inclusive concept not reducible to the FFM; hence the present emphasis on the FFM, interests, and attributions as separate personality domains. Nevertheless, the authors do not presume that this taxonomic issue in the study of personality has been resolved.
- <sup>2</sup> Detailed information on the 1999-2000 cohort is found in the *Guide to National Board Certification* (National Board for Professional Teaching Standards, 1999). Updated material is available from the NBPTS Web site: <http://www.nbpts.org>.
- <sup>3</sup> For each teaching specialty, the 10 NBPTS exercise scores (see text) are weighted in accordance with expert judgments of relative importance and then summed to form the NBPTS weighted total raw score. The pass/fail cut point on this scale is 263, with possible scores ranging from 75 to 425. The NBPTS adds a 12-point constant to the candidate's weighted total raw score, moving the official cut point to 275, with possible scores ranging from 87 to 437. However, the unweighted continuous NBPTS total score, not the official NBPTS cut score, is used in the present research.
- <sup>4</sup> The larger project included other personality instruments. So as not to discourage participation, potential participants received no more than four personality instruments, and some received less than four.
- <sup>5</sup> Data collection was conducted by NCS Pearson, Inc., which reproduced the letter and scannable research instruments, assembled them into packages for the mailings, assigned packages as noted in the text, assigned the participant code numbers, sent the mailings and the follow-up postcards, received the returned instruments, scanned the returned responses, electronically recorded the responses on disk, and sent the disk to ETS for analysis.
- <sup>6</sup> The Air Force Self-description Inventory was modified here in several ways, all minor: The computerized format was converted to a paper-and pencil format, and present scoring was based on linear transformations of the adjective scale, as explained in the text.

- <sup>7</sup> In this study, the UNIACT labels are used to present and interpret findings, as these labels are closer in meaning to the contents of their respective scales than are several of the broader RIASEC categories.
- <sup>8</sup> Copyright © 2004 by Educational Testing Service (ETS). All rights reserved. The Attribution Inventory for Teachers--Short Form (AIT-S) was developed by Walter Emmerich, who has granted ETS all rights to it.
- <sup>9</sup> Using only four items per item type posed obvious psychometric risks. Yet the intent here was not to develop a complete psychometric instrument, but rather to provide initial evidence on the short-form measures and their relationships with other study variables.
- <sup>10</sup> For each of the six discriminant function analyses reported in this paper, a statistical test that simultaneously included the second canonical correlation together with the remaining canonical correlations (except the first) was significant ( $p < .001$ ). In several instances, tests for additional canonical correlations also were significant. However, we report and interpret only the first two canonical correlations from each analysis, as they uniformly accounted for much of the between-group variance (at least 75%, and typically more).
- <sup>11</sup> The one exception was Early Adolescent Generalist, for which YTE was negatively associated with teaching performance ( $\beta = -.32, p < .05$ ). However, rather than weakening the contributions of the FFM dimensions to the  $R$ , inclusion of YTE in this case tended to enhance their contributions. Because uninterpretable suppressor effects appeared to be involved, the stronger effects are not reported here in detail.
- <sup>12</sup> Introducing separate ability and knowledge measures seemed inappropriate for established professionals applying for advanced certification.
- <sup>13</sup> The NBPTS uses objective information (credentials) to classify candidates into one or another teaching specialty. Of course, misclassifications could occur in the psychological sense that some teachers might prefer to be teaching a different specialty (or the same specialty at a different grade level). However, such misclassifications would be more likely to attenuate than inflate the relationships reported here.

