More than thirty years of publishing research articles related to the theory and applications of psychological type and the Myers-Briggs Type Indicator® instrument.

71

Journal of Psychological Type®

Issue 3 | SEP 11

> Following teacher and student training in the application of type principles to the classroom environment, 6th grade students' grades showed significant improvements compared to pre-type (prior-year) students. Student attitudes about the learning environment also showed post-training improvements.

The Impact on Student Academic Performance and Attitudes of Psychological Type and its Introduction to the Classroom

Robert W. McPeek[1]
Chris Urquhart[2]
Judith F. Breiner[1]
David F. Holland[2]
David Cavalleri[3]

[1]Center for Applications of Psychological Type, Inc.
[2]Birdville Independent School District, Haltom City, TX
[3]College of Education, University of Florida

ABSTRACT

All 26 teachers and 253 students in a 6th grade public middle school class participated in a year-long study of the effect of incorporating psychological type-based teaching methods into the classroom. Academic grades for students significantly improved in the type study year, compared to grades given in the prior year by the same teachers for the same courses. Improvements were consistently greater for students in on-level courses compared to Pre-Advanced Placement students. Standardized test results failed to show similar improvements. Student ratings of their teachers' ability to "make new information easy for me to understand," as well as their self-ratings regarding comfort in sharing ideas in class, level of respect accorded them, and appreciation of their "own unique way of learning" also improved over the course of the year. Student type preferences were correlated with academic grades, standardized test scores, teacher ratings, self ratings, and learning environment ratings. Consistent with previous findings, P students and (especially) N students earned higher standardized test scores than their opposites, while J students earned higher grades than P students. E students reported more comfort in class and comfort sharing information in class than I students did, while F students reported more appreciation of their own learning style

Published by the Center for Applications of Psychological Type
Thomas G. Carskadon, Ph.D., Founding Editor
ISSN 1938-3290

than T students did. F preference students earned higher grades than T students, and S students reported higher confidence, a higher sense of being respected, and more comfort sharing information than N students, findings that are less consistent for older students. These results underscore the need for further research examining the relationship of type development to academic performance and the personal experience of learning.

Note: For the Myers-Briggs Type Indicator® (MBTI®) instrument, the eight preference categories are the following: Extraversion (E) versus Introversion (I), Sensing (S) versus Intuition (N), Thinking (T) versus Feeling (F), Judging (J) versus Perceiving (P).

THE IMPACT ON STUDENT ACADEMIC PERFORMANCE AND ATTITUDES OF PSYCHOLOGICAL TYPE AND ITS INTRODUCTION TO THE CLASSROOM

A commonly held educational precept is that students learn better when the presentation of information is tailored to match the ways they learn. The concept of learning styles is frequently presented in current educational psychology textbooks, and investment in differentiated instruction training is sometimes a significant part of the budget for many schools (Pashler, McDaniel, Rohrer, & Bjork, 2008). The learning style model coexists uncomfortably with the standardized testing emphasis of the No Child Left Behind legislation, often criticized for its "focus on 'all children' instead of on 'each child'" (Bravman, 2004, p. 5).

Despite the wide acceptance of the learning styles concept, Pashler et al. (2008) lament the lack of compelling evidence that incorporating different learning styles into teaching actually improves student performance. Practice is further complicated by the profusion of learning style approaches, offered in at least 71 varieties (Coffield, Moseley, Hall, & Ecclestone, 2004). Early classifications of learning styles focused on identification of gifted learners (e.g., Ward, 1961) and ability-based learning tracks (e.g., Swiatek, 2001). More recent approaches have emphasized different kinds of intelligences (e.g., Carbo, 1995; Gardner, 1983), use of different sensory modalities (e.g., Barsch, 1991; Dunn & Dunn, 1998), Kolb's (1984, 1985) Learning Style Inventory, and several other schemes (see Coffield et al., 2004).

One promising means of classifying students' learning styles is the assessment of student psychological types, based on the original framework proposed by Carl Jung (1923/1971) and further developed by Isabel Myers (e.g., 1962). Psychological type theory is not only directly relevant to the learning process, but, with its emphasis on *positive* psychological differences (see Myers & Myers, 1980), the theory allows classification of different kinds of learners without stigmatizing some styles as less effective.

Psychological type is perhaps best known through use of the Myers-Briggs Type Indicator®, or MBTI®, assessment (Myers, McCaulley, Quenk, & Hammer, 1998), an instrument designed to assess four key personality dimensions developed by Myers from her study of Jung. Because the MBTI instrument is "most appropriate" for age 14 and above (Myers et al., 1998, p. 106), its primary use has been with adults. Type in younger people (age 7 and up) can be assessed using the Murphy-Meisgeier Type Indicator for Children®, or MMTIC®, instrument. Both instruments have substantial evidence for reliability and validity (Murphy & Meisgeier, 2008; Myers et al., 1998). Research has also shown that the two instruments produce similar results when used with children at the ages where the two instruments overlap (Gilbert, 1998; Lang, 1999).

Much of the focus of type theory is concerned with individual differences in preferred modes of perceiving and evaluating information, both essential steps in the learning process. In type theory, *perceiving* and *judging* each occur in two opposing modes or *functions*. Perceiving can take place using either the *Sensing* or *Intuition* preference, while judging takes either a *Thinking* or *Feeling* form. Any person is capable of exercising any and all of these four preferences; however, each person will prefer to use one of the perceiving (S or N) or judging (T or F) functions over the other.

The Sensing preference pays attention to the here and now (concrete information and details), while a person who prefers Intuition is oriented towards patterns, concepts and abstractions beyond the immediate facts. The Thinking preference is most comfortable with an analytical approach and the use of logic in evaluating information, while the Feeling preference gives more weight to personal relationships and values when making decisions.

There are four possible function pair (perceiving-judging) combinations (ST, NT, SF, NF), identified by the middle two letters of one of 16 possible four-letter types (e.g., ISTJ, ENFP) identified by both the MBTI and MMTIC instruments. The first and last letters in the four-letter type code indicate preferences for the remaining two type domains, *Extraversion–Introversion* (E–I) and *Judging–Perceiving* (J–P).

E–I represents the attitude or direction (outward

for Extraversion or inward for Introversion) in which an individual most frequently and comfortably focuses his or her attention. J–P indicates the preferred way an individual orients him/herself to the outer world. A Judging preference is associated with a structured, decisive, organized, and scheduled approach, while a Perceiving preference is more concerned with gathering information, spontaneity, openness, and flexibility. (Note again that a key concept in type theory is that any preference is a primary, but not absolute, way of operating and that every child and adult is capable of exhibiting both their preferred approaches and their opposites.)

Type theory predicts that children will learn better when the learning environment and curriculum are compatible with their type preferences. Teachers are likely to teach, communicate, and evaluate in ways consistent with their own personal preferences, benefiting students of similar types. Reliance upon a single teaching style will resonate with some, but not all, students. A mismatch of learning and teaching styles means some students may struggle, need extra help, exhibit poor motivation, grow frustrated, abandon effort, skip school, or exhibit other behavior problems (see Lawrence, 2009).

A teacher's appreciation of type preferences (both personal and those of each student) can lead to better lesson planning, learning activities, and presentations that will reach and motivate more students (e.g., Lawrence, 2009). Type-related teaching does not exclude any strategies that a given teacher has found to be effective. Rather, the organizing theory of type provides expansion, enrichment, and refinement of existing teaching strategies and a shared framework to engage both teachers and learners (Kise, 2007).

The long history of research on type and education (for reviews and examples, see DiTiberio, 1996, 1998; Kise, 2007; Lawrence, 1984; Myers et al., 1998) offers some encouraging results. However, many of the studies have been correlational in design, often limited to describing type preferences of successful teachers (e.g., Mills, 2003; Rushton, Knopp & Smith, 2006) or successful students (e.g., Myers et al., 1998). Promising studies showing both attitudinal and academic performance improvements in students following the introduction of type-based curricula (e.g., Fischetti & Mentore- Lee, 2001; Kise, 2004) are often limited in their scope, rigor, or quantitative analysis.

This paper reports research conducted in a public school in Texas, where 6th grade teachers were instructed in the theory of psychological type and provided year-long guidance and support in its application in the classroom. We used a pretest-posttest design in which the academic performance of two different student cohorts was measured before and after a group of teachers received new training. Though the restrictions imposed by the school precluded a true experimental design with random assignment of teachers to training or control groups, Campbell and Stanley (1969) note that such designs are "worth doing where nothing better can be done" (p. 7).

Teachers' psychological types were assessed, as were those of their 6th grade pupils (the "type-year group"). Students also received instruction in the basic concepts of type, with an emphasis on understanding themselves, their learning strengths and challenges, and improving relationships with peers and adults. Data collected included student academic grades throughout the school year as well as grades retroactively collected from the previous year's class (the "prior-year group") from the same grade level for the same teachers and courses. Fifth and 6th grade standardized test results in reading and mathematics were also collected for both student groups. Finally, for the type-year group, student attitudes towards their teachers, the school environment, and themselves were surveyed at the beginning of the type program, one month after the program's launch, and at the end of the school year.

We predicted that the introduction of type-based teaching would facilitate significant improvements in student academic performance (both grades and standardized tests) for the type-year group compared to the prior-year group. We expected to see improved grade performance as teachers and students learned and applied more type principles, with peak results in term 3 at the conclusion of type education and before the holiday break. We also expected to see positive changes in student attitudes over the course of the school year, as measured by the student ratings in the following areas:

1. Teachers' ability to make information easier to understand, to present information in new ways, and to help students prepare for tests;
2. Students' overall comfort in the classroom and their comfort in sharing ideas in class; and
3. Students' levels of self-confidence, self-appreciation, expectations of success, and respect felt in class.

METHOD

Location

The participating institution was a public middle school (grades 6–8) located in a middle-class suburb of Fort Worth, Texas. Median household income for the city in 2008 was $69,129, as compared to the Texas state average of $50,043. Only 5.3% of the residents of the city were foreign born, and unemployment was generally low (City-data.com, 2010). The present study's second author, a certified MBTI professional and school counselor, had worked at the school for several years and served as the onsite project coordinator.

Participants

All 26 teachers (23 females, 3 males) and 253 students (118 females, 131 males, 4 unreported) in the 6th grade class participated in the study. The participating teacher group included the core content teachers, special education teachers, physical education and elective teachers, and the gifted and talented specialist. Thirty-five percent of the teachers had master's degrees. The average number of years of teaching experience was 14.58, *SD* = 9.15.

The mean student age was 11.26 years, with a range from 10 to 13 and a standard deviation of 0.51 years. Modal age (71% of the sample) was also 11 years old. Ethnicity data (available for 244 students) indicated that the type-year sample was 52% white, 36% Hispanic, 7% African American, and 5% Asian/Pacific Islander, and less than 1% Native American.

Psychological Type Measurement

Prior to training, teachers took the 93-item, forced choice MBTI Form M assessment online, and students completed the online form of the 43-item Murphy-Meisgeier Type Indicator for Children, or MMTIC, instrument. Both instruments produced a 4-letter indication of one of sixteen types (ESFP, INTJ, etc.).

Type Training

Teachers. Type training for teachers was delivered in four 2-hour installments, the first just prior to the fall term. Session one included a general introduction to the concepts of psychological type (with particular focus on Extraversion-Introversion), a review and discussion of personal MBTI assessment results, distribution of supporting materials including books on using type in the classroom, and formation of a subcommittee to introduce type concepts to parents. Three additional sessions, each including lecture, demonstration, exercises, and discussion, focused on the remaining three type dichotomies: Sensing/Intuition (mid-September); Thinking/Feeling (mid-October); and Judging/Perceiving (early November). An additional short meeting in late October focused on presenting type concepts to parents. Teachers received incentives to improve attendance at these sessions.

In addition to workshop instruction, teachers participated in six monthly after-school workshops to reinforce type concepts and introduce coordinated strategies and activities for engaging students with different types. Short weekly e-mails were distributed to each teacher throughout the year to maintain awareness of the program and to provide easy-to-implement practical strategies for improving instruction.

Students. Type concepts were taught beginning in mid-September with four weekly 45-minute classes covering the basics of type. Sessions followed the format outlined in the student workbook, *Exploring Personality Type: Discovering My Strengths and Stretches* (Murphy, 2008), and included individual MMTIC reports with type results. In March, just prior to the administration of state assessments, two additional classes were conducted that focused on study skills and test-taking strategies.

Parents. There were four opportunities for parent type education: at a mini-camp for 6th graders in late August, at the school's open house in mid-September, and at two evening sessions during the second six-week term. Sessions focused on basic knowledge of type concepts and ways to integrate type into family dynamics and to improve study habits at home.

Data Collection

Grades. Academic grades for each student were collected in the five core curriculum courses (science, mathematics, English, reading, and social studies) for the six grading terms of the school year. Grades were also collected for the prior year's 6th grade students. Comparing grades from the two years matched for term, subject, track, and teacher minimized the effects of differences in teacher leniency and curriculum difficulty (both between subjects and within any subject over the course of a school year).

Standardized tests. Both 5th and 6th grade math and reading standardized test scores on the Texas Assessment of Knowledge and Skills (TAKS) were collected for both the type-year and prior-year students. This allowed

both between and within subjects comparisons.

Student ratings. Type-year students completed a short questionnaire[1] (9 items of which were analyzed for this report) at three times over the course of the year. Items on the questionnaire were presented as statements (e.g., "My teacher makes new information easy for me to understand" and "I am comfortable sharing my ideas in class"). Students were asked to check one of five boxes (labeled "almost always," "often," "sometimes," "rarely," and "almost never") to represent their answer. Responses were coded 1 (almost always) to 5 (almost never). The first administration of the questionnaire took place about a month after the school year began, at the beginning of the introduction of type instruction to the students. The second data collection occurred about a month later, after students had received four 45-minute type lessons (including personal feedback on their MMTIC results) and their teachers had used type in their classroom instruction. The final administration took place in mid May. Forms were distributed and collected independently of teachers being rated, and students were told teachers would not see their responses.

Teacher surveys. Teachers completed two short questionnaires, once in mid-October and again in mid-May, aimed at measuring their perceptions of their own teaching styles, strengths, and stretches; their awareness of and sensitivity to individual differences in their students; their familiarity with type theory; and the degree to which they incorporated strategies from type training into their teaching.

Results

Teachers' Responses to Type Training. Of the 26 teachers involved in the study, 25 completed the initial teacher survey, and 23 completed both. Survey #1 results indicated that the type training was successful, as 19 of 25 teachers agreed or strongly agreed with the statement "I am familiar with personality type theory as measured by instruments such as the Myers-Briggs Type Indicator assessment." Twenty-three of 24 respondents agreed or strongly agreed that "I have received beneficial instruction in personality type theory and strategies for its application in the classroom."

At the end of the school year, 21 of 23 teachers agreed that they had successfully incorporated type concepts into their teaching. Fifteen of 23 agreed or strongly agreed that "I implemented one teaching strategy related to learning styles each week," the primary performance goal of the program.

Teachers demonstrated a significantly greater level of agreement with two survey items at the end of the school year than at the beginning: "I have a good understanding of the different strengths and stretches of my students," $F(1, 20) = 13.69$, $p = .001$, and "I am able to group my students based on their personalities in order to meet their differing needs," $F(1, 20) = 10.44$, $p = .004$. There were no significant changes for the items "I have a good understanding of my own teaching strengths and stretches"; "My students have responded to my teaching strategies in a positive manner"; "I notice individual personality differences among my students"; and "I am able to respond to individual differences among my students."

Student and Teacher Types

Table 1 (See page 59.) shows the distribution of types and preferences for the 250 6th graders who completed the MMTIC. This distribution is very similar to the results for 6th grade students reported in the *MMTIC® Manual* (Murphy & Meisgeier, 2008). Only one comparison (fewer proportionate NJs in our sample, 10% vs. 16%) differed significantly in percentage representation, x^2 (1, $N = 1154$) = 5.39, $p = .02$. Since there are 60 possible frequency comparisons in a type table, one significant result would be expected by chance alone. Further evidence of the similarity of our sample to the manual data comes from a significant rank order correlation between the two rankings of whole type frequency, *rho* (10) = .90, $p < .001$. Similar correspondence between MMTIC results and normative U.S. adult population type frequencies is reported in the *MMTIC® Manual*.

Table 2 (See page 60.) shows the distribution of types and preferences for the 26 participating teachers, compared to a larger sample of middle school/junior high school teachers extracted from the database of the Center for Applications of Psychological Type (Macdaid, McCaulley, & Kainz, 2005). Eleven of 16 types were represented within the 26 teachers, with ESFJ the most common ($n = 6$). There were significantly higher percentages of teachers in our group with a preference for S, x^2 (1, $N = 1154$) = 4.88, $p = .03$, SF, x^2 (1, $N = 1154$) = 5.15, $p = .02$, and ES, x^2 (1, N = 1154) = 3.99, $p = .05$. (Note that the potential for Type I errors from 60 analyses is partially offset by the reduced analytical power of our small sample size. See Cohen, 1988.)

Table 1. Watauga 6th Graders Compared to 6th Graders from the *MMTIC® Manual*.

The Sixteen Complete Types

ISTJ *n* = 25 (10.00%) *I* = 0.25 + + + + + + + + + +	ISFJ *n* = 25 (10.00%) *I* = 1.00 + + + + + + + + + +	INFJ *n* = 8 (3.20%) *I* = 1.08 + + +	INTJ *n* = 5 (2.00%) *I* = 0.65 + +
ISTP *n* = 10 (4.00%) *I* = 0.94 + + + +	ISFP *n* = 3 (1.20%) *I* = 0.39 +	INFP *n* = 14 (5.60%) *I* = 1.09 + + + + +	INTP *n* = 13 (5.20%) *I* = 0.96 + + + + +
ESTP *n* = 16 (6.40%) *I* = 1.18 + + + + + +	ESFP *n* = 14 (5.60%) *I* = 0.91 + + + + + +	ENFP *n* = 32 (12.80%) *I* = 1.12 + + + + + + + + + + + + +	ENTP *n* = 21 (8.40%) *I* = 1.17 + + + + + + + +
ESTJ *n* = 16 (6.40%) *I* = 0.83 + + + + + +	ESFJ *n* = 36 (14.40%) *I* = 1.38 + + + + + + + + + + + + + +	ENFJ *n* = 9 (3.60%) *I* = 0.54 + + + +	ENTJ *n* = 3 (1.20%) *I* = 0.39 +

Dichotomous Preferences

E	147	(58.80%)	*I* = 1.01
I	103	(41.20%)	*I* = 0.98
S	145	(58.00%)	*I* = 1.05
N	105	(42.00%)	*I* = 0.93
T	109	(43.60%)	*I* = 0.99
F	141	(56.40%)	*I* = 1.01
J	127	(50.80%)	*I* = 0.98
P	123	(49.20%)	*I* = 1.02

Pairs and Temperaments

IJ	63	(25.20%)	*I* = 1.05
IP	40	(16.00%)	*I* = 0.90
EP	83	(33.20%)	*I* = 1.10
EJ	64	(25.60%)	*I* = 0.92
ST	67	(26.80%)	*I* = 1.06
SF	78	(31.20%)	*I* = 1.05
NF	63	(25.20%)	*I* = 0.96
NT	42	(16.80%)	*I* = 0.90
SJ	102	(40.80%)	*I* = 1.13
SP	43	(17.20%)	*I* = 0.91
NP	80	(32.00%)	*I* = 1.10
NJ	25	(10.00%)	**I* = 0.63
TJ	49	(19.60%)	*I* = 0.90
TP	60	(24.00%)	*I* = 1.08
FP	63	(25.20%)	*I* = 0.98
FJ	78	(31.20%)	*I* = 1.04
IN	40	(16.00%)	*I* = 0.96
EN	65	(26.00%)	*I* = 0.91
IS	63	(25.20%)	*I* = 1.00
ES	82	(32.80%)	*I* = 1.10
ET	56	(22.40%)	*I* = 0.96
EF	91	(36.40%)	*I* = 1.05
IF	50	(20.00%)	*I* = 0.95
IT	53	(21.20%)	*I* = 1.02

Jungian Types (E)

	n	*%*	*Index*
E–TJ	19	7.60	0.71
E–FJ	45	18.00	1.05
ES–P	30	12.00	1.04
EN–P	53	21.20	1.14

Jungian Types (I)

	n	*%*	*Index*
I–TP	23	9.20	0.95
I–FP	17	6.80	0.83
IS–J	50	20.00	1.11
IN–J	13	5.20	0.86

Dominant Types

	n	*%*	*Index*
Dt. T	42	16.80	0.82
Dt. F	62	24.80	0.98
Dt. S	80	32.00	1.08
Dt. N	66	26.40	1.07

***N* = 250 + = 1% of *N* *I* = Selection Ratio Index *$p<.05$ **$p<.01$ ***$p<.001$**

Robert McPeek, Judy Breiner, David Holland, Chris Urquhart, David Cavalleri

Table 2. Texas 6th Grade Teachers Compared to Sample of Teachers in Middle School or Junior High School.

The Sixteen Complete Types

ISTJ *n* = 3 (11.54%) *I* = 1.03 + + + + + + + + + + + +	ISFJ *n* = 4 (15.38%) *I* = 1.26 + + + + + + + + + + + + + + +	INFJ *n* = 1 (3.85%) *I* = 0.77 + + + +	INTJ *n* = 1 (3.85%) *I* = 0.85 + + +
ISTP *n* = 0 (0.00%) *I* = 0.0	ISFP *n* = 1 (3.85%) *I* = 1.21 + + + +	INFP *n* = 1 (3.85%) *I* = 0.65 + + + +	INTP *n* = 0 (0.00%) *I* = 0.00
ESTP *n* = 0 (0.00%) *I* = 0.00	ESFP *n* = 4 (15.38%) *I* = 4.04 + + + + + + + + + + + + + + +	ENFP *n* = 1 (3.85%) *I* = 0.35 + + + +	ENTP *n* = 0 (0.00%) *I* = 0.00
ESTJ *n* = 2 (7.69%) *I* = 0.84 + + + + + + + +	ESFJ *n* = 6 (23.08%) *I* = 2.00 +	ENFJ *n* = 0 (0.00%) *I* = 0.00	ENTJ *n* = 2 (7.69%) *I* = 1.77 + + + + + + + +

Dichotomous Preferences

E	15	(57.69%)	*I* = 1.08
I	11	(42.31%)	*I* = 0.91
S	20	(76.92%)	**I* = 1.40
N	6	(23.08%)	**I* = 0.51
T	8	(30.77%)	*I* = 0.78
F	18	(69.23%)	*I* = 1.15
J	19	(73.08%)	*I* = 1.11
P	7	(26.92%)	*I* = 0.78

Pairs and Temperaments

IJ	9	(34.62%)	*I* = 1.05
IP	2	(7.69%)	*I* = 0.56
EP	5	(19.23%)	*I* = 0.94
EJ	10	(38.46%)	*I* = 1.17
ST	5	(19.23%)	*I* = 0.79
SF	15	(57.69%)	***I* = 1.88
NF	3	(11.54%)	*I* = 0.39
NT	3	(11.54%)	*I* = 0.76
SJ	15	(57.69%)	*I* = 1.31
SP	5	(19.23%)	*I* = 1.74
NP	2	(7.69%)	*I* = 0.33
NJ	4	(15.38%)	*I* = 0.71
TJ	8	(30.77%)	*I* = 1.05
TP	0	(0.00%)	*I* = 0.00
FP	7	(26.92%)	*I* = 1.12
FJ	11	(42.31%)	*I* = 1.16
IN	3	(11.54%)	*I* = 0.65
EN	3	(11.54%)	*I* = 0.43
IS	8	(30.77%)	*I* = 1.06
ES	12	(46.15%)	**I* = 1.76
ET	4	(15.38%)	*I* = 0.80
EF	11	(42.31%)	*I* = 1.24
IF	7	(26.92%)	*I* = 1.02
IT	4	(15.38%)	*I* = 0.75

Jungian Types (E)

	n	%	*Index*
E–TJ	4	15.38	1.14
E–FJ	6	23.08	1.19
ES–P	4	15.38	2.75
EN–P	1	3.85	0.26

Jungian Types (I)

	n	%	*Index*
I–TP	0	0.00	0.00
I–FP	2	7.69	0.84
IS–J	7	26.92	1.15
IN–J	2	7.69	0.81

Dominant Types

	n	%	*Index*
Dt. T	4	15.38	0.85
Dt. F	8	30.77	1.08
Dt. S	11	42.31	1.46
Dt. N	3	11.54	0.47

***N* = 26 + = 1% of *N* *I* = Selection Ratio Index **p*<.05 ***p*<.01 ****p*<.001**

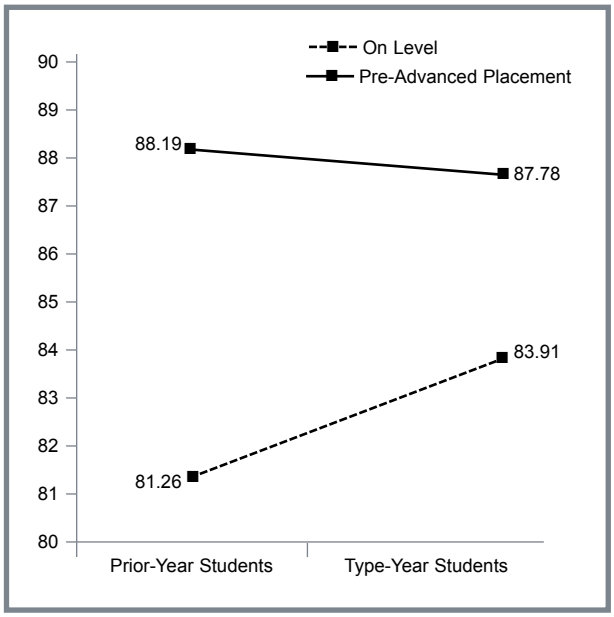
Robert McPeek, Judy Breiner, David Holland, Chris Urquhart, David Cavalleri

Grades

The school offered core curriculum subjects (English language arts, reading, mathematics, science, and social studies) at three levels: Pre-Advanced Placement (PAP), on-level (OL), and special education (SE). In most cases, choice of course level for each subject is left to students and their parents. We collected grade data from seven teachers (two each for English, reading, and science, and one for math) who taught the same course at the same level in both the type-year and the prior school years (the prior-year data were collected retroactively during the study year). No match existed for the fifth core curriculum subject, social studies. One English and one reading teacher taught only OL students, while the other teacher in each pair taught both OL and PAP students. One science teacher taught OL courses and one PAP. The math teacher taught only PAP courses in both years. Because of small enrollments and lack of year-to-year matches, data from special education courses were excluded.

Academic grades were averaged across all six terms for all four subjects and analyzed using a 2 x 2 analysis of variance (ANOVA), with student cohort (prior or type year) and course level (OL or PAP) as the two independent variables. The results are shown in **Figure 1**.

Figure 1. Mean School Year Grades (Averaged Across Terms) by Course Level and Student Cohort.



A significant main effect was detected for both course level, $F(1, 1187) = 141.48$, $p < .001$, and cohort, $F(1, 1187) = 6.09$, $p = .01$. The interaction between the two variables was also significant, $F(1, 1187) = 11.34$, $p < .001$, indicating that OL students' grades improved more (mean gain = +2.65 grade points) from one year to the next than PAP students (mean change = -0.41 points). The main effect for improvement in the second year was thus wholly attributable to OL students. The course level main effect confirmed that students in advanced courses earned higher grades[2].

Table 3 (See page 62.) shows the results for the two student cohorts broken down by the four core subjects that allowed year to year comparisons. Two of the four subjects showed significant improvements in the type-year group: English, $F(1, 375) = 5.39$, $p = .02$; and reading, $F(1, 341) = 5.58$, $p = .02$. The interactions of cohort and course level were not significant, $F(1, 375) = 0.85$, $p = .36$ for English; $F(1, 341) = 1.89$, $p = .17$ for reading. However, this interaction was significant for science grades, $F(1, 317) = 3.44$, $p = .06$, as OL students' grades improved (M = +2.05 points) while PAP students declined (M = -1.24 points). For math, which included only students in a PAP level course, scores did not differ significantly between the two student groups, $t(144) = 1.57$, $p = .12$. Though results were not always significant, the trend for OL students to improve more than PAP students was consistent for every subject.

We predicted any effect of type would be strongest in the first semester—in particular, during the third 6-week grading period, when the program was most fully implemented and active. As shown in **Table 4** (See page 62.), these predictions were supported by the results of additional 2 x 2 (course level x student cohort) ANOVAs comparing specific terms across the two years.

Semester one average grades were significantly higher in the type year than the prior year, $F(1, 1276) = 11.29$, $p < .001$, as were term 3 grades, $F(1, 1260) = 48.65$, $p < .001$, the only term in which grades for both PAP and OL students improved in the type training year. The most common pattern across terms was for grades in the type training year to be higher for OL students than in the previous year, while grades for PAP students were relatively equal, or, in some cases, lower in the type year. This resulted in a significant course level x school year interaction for grades in term 1, $F(1, 1268) = 4.40$, $p = .04$; term 2, $F(1, 1270) = 7.09$, $p = .008$; term 3, $F(1, 1260) = 16.14$, $p < .001$; term 4,

Table 3. Mean Six-Term Grades Averaged Across Four Core Subjects by Student Cohort.

Level/Subject	Prior-Year Students *n*	*M*	*SD*	Type-Year Students *n*	*M*	*SD*	Mean YTY Change
OL English*	100	80.41	9.53	144	83.53	8.94	3.12
PAP English*	80	88.36	7.73	55	89.71	8.59	1.24
OL Math	n/a	n/a	n/a	n/a	n/a	n/a	n/a
PAP Math	86	87.31	6.35	60	85.51	7.18	-1.80
OL Science**	74	81.32	8.66	132	83.37	6.78	2.05
PAP Science**	48	87.61	6.95	67	86.37	7.5	-1.24
OL Reading*	93	82.11	7.30	121	84.95	6.78	2.84
PAP Reading*	77	89.37	6.21	54	90.11	6.43	0.74

** Significant main effect (p = .02) for student cohort: type-year grades higher.*
*** Significant interaction (p = .06) of student cohort x course level: type-year grades higher for OL students only.*

Table 4. Mean Grades Averaged Across Four Core Subjects by Student Cohort and Term.

Grade Term	OL Students Prior Year *n*	*M(SD)*	Type Year *n*	*M (SD)*	Mean YTD Change	PAP Students Prior Year *n*	*M(SD)*	Type-Year *n*	*M(SD)*	Mean YTD Change
Term 1[a]	267	84.51 (9.44)	452	86.17 (8.50)	1.66	291	87.56 (7.25)	262	87.12 (9.29)	-0.44
Term 2[b]	267	81.28 (10.48)	451	83.55 (10.54)	2.27	291	87.90 (8.21)	265	87.05 (11.32)	-0.85
Term 3[c, d]	268	79.00 (10.75)	445	84.76 (10.30)	5.76	291	88.06 (7.64)	260	89.61 (9.18)	1.55
Semester 1[c, d]	268	81.57 (8.77)	455	84.73 (7.88)	3.16	291	87.84 (8.34)	266	87.77 (8.84)	-0.07
Term 4[c]	276	78.21 (11.79)	440	80.68 (11.23)	2.47	293	88.79 (10.10)	253	84.51 (11.39)	-4.28
Term 5	276	81.49 (10.43)	436	81.44 (10.10)	-0.05	293	87.56 (8.53)	256	87.86 (8.11)	0.30
Term 6[b]	276	82.65 (12.32)	410	83.82 (10.48)	1.17	293	89.19 (12.13)	248	86.52 (11.92)	-2.67
Semester 2[b]	276	80.79 (9.76)	443	81.70 (9.39)	0.91	293	88.52 (8.55)	257	86.13 (9.07)	-2.39

[a] Significant interaction (p < .05): OL greater gain than PAP in type year.
[b] Significant interaction (p < .01): OL greater gain than PAP in type year.
[c] Significant interaction (p < .001): OL greater gain than PAP in type year.
[d] Significant main effect (p < .001): type-year group higher than prior-year group.
Note. *Standard deviations are shown in parentheses.*

$F(1, 1258) = 27.72$, $p < .001$; term 6, $F(1, 1223) = 8.14$, $p = .004$; semester one, $F(1, 1276) = 12.30$, $p < .001$; and semester two, $F(1, 1265) = 9.70$, $p = .002$. Term 5 was the lone exception, where the interaction was non-significant, $F(1, 1257) = .10$, $p = .75$.

Standardized Tests

It was hypothesized that type-year students would show significant improvement on the Texas Assessment of Knowledge and Skills (TAKS) achievement tests. Sixth grade students were assessed in mathematics and read-

Figure 2. Mean Math Standardized Test Z-Scores for Both Student Cohorts in Grades 5 and 6.

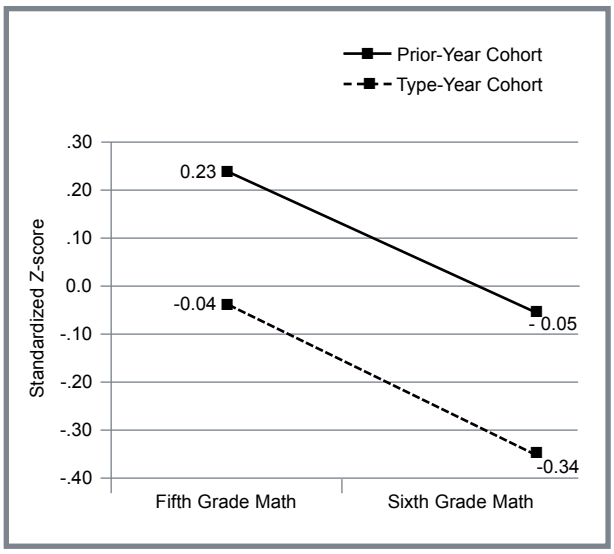
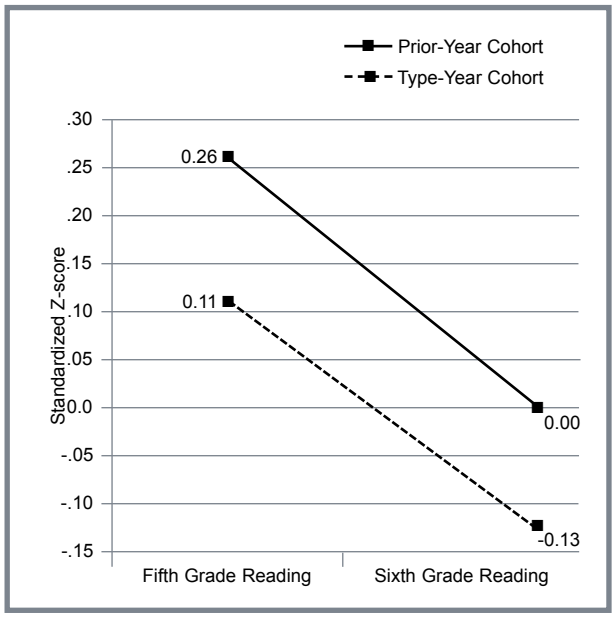


Figure 3. Mean Reading Standardized Test Z-Scores for Both Student Cohorts in Grades 5 and 6.



ing in April (grading term 5). Because standardized test content changes from year to year, rendering score comparisons difficult to interpret, we first converted scaled test scores to z-scores using statewide means and standard deviations for equivalent tests (same year, same subject, same grade level). This procedure allowed us to better compare performance on different tests in different years, measured in comparison to statewide averages. The resulting math and reading z-scores from the 5th and 6th grades for type-year and prior-year students were then analyzed using a 2 x 2 repeated measures ANOVA (student cohort x grade when tested). (All further mentions of scores refer to z-scores.)

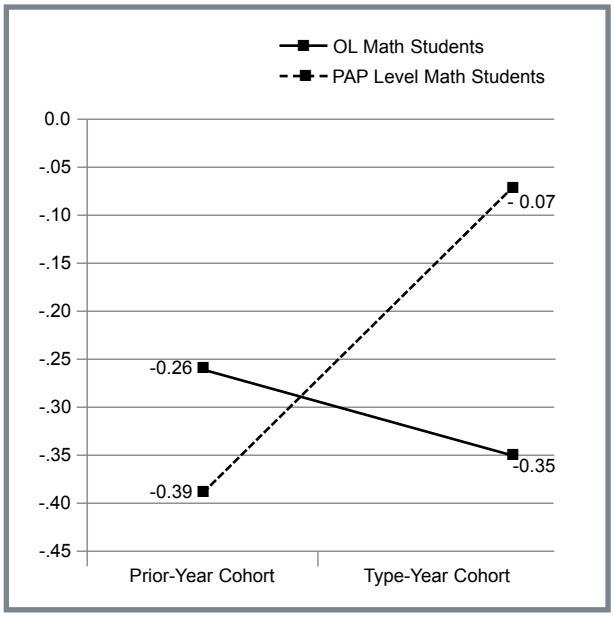
As can be seen in **Figures 2 and 3**, this hypothesis was not supported. Regardless of cohort, student scores significantly decreased in 6th grade both in math, $F(1, 419) = 75.80$, $p < .001$, and reading scores, $F(1, 413) = 7.98$, $p = .005$. Also, for both math, $F(1, 420) = 10.80$, $p < .001$, and reading, $F(1, 413) = 7.19$, $p = .008$, the prior-year student scores were higher than the type-year cohort in both 5th and 6th grades.

To check for any effects of course level on achievement scores, we calculated gain scores for both math and reading TAKS z-scores by using each student's 5th grade score as a baseline to measure improvement (or decline) in 6th grade.

Results for math are shown in **Figure 4**. Though all math scores declined, PAP students declined less than OL students, $F(1, 417) = 4.94$, $p = .03$. The mean decline for PAP students during the type year (M = -0.07) was much lower than the decline for all OL students (M = -0.34) or prior-year PAP students (M = -0.35). Statistically, this pattern was revealed as a significant interaction between student cohort and course level, $F(1, 417) = 9.56$, $p < .01$.

There were no significant differences (no main effects or interaction effects) between PAP and OL level students for changes in reading scores (all $p > .13$).

Figure 4. Mean Math Standardized Test Z-Score Changes for Both Student Cohorts by Math Course Level.



Student Attitudes

We predicted positive changes in students' attitudes toward their teachers, learning environment, and themselves over the course of the school year as type training progressed. These hypotheses were tested in a repeated measures ANOVA comparing three ratings, in September (pre-type), October (mid-type), and May (year end). The ANOVA was followed by pair-wise comparisons of the three repeated measures using (Least Significant Differences tests).

The results are summarized in **Table 5** (See page 65.) and indicate mixed support for our predictions:

1. Teacher ratings. Ratings for the item "my teacher makes new information easy for me to understand" improved after the first measurement, while ratings for "my teacher helps me to learn in new ways" declined. There were no significant differences for the item "my teacher helps me come up with good ideas about how to do well on tests."
2. Comfort ratings. Students indicated they were significantly more "comfortable sharing my ideas in class" with each successive survey. However, there were no significant differences for the statement, "I feel comfortable in my classroom."
3. Other student self-ratings. Two ratings improved after the pre-type measurement, with students agreeing more with the statements "I feel respected in my classroom" and "I appreciate my own, unique way of learning." There were no significant differences for the statements "I am confident I will succeed in this classroom" or "I know how to successfully complete what is expected of me in my class."

Student Type Differences

Student academic grades in core subjects (English, math, reading, science, and social studies), standardized test scores (TAKS math and reading), and questionnaire responses (ratings of teachers and self-ratings) were analyzed as a function of preference. Small n-values in several type cells precluded analyses based on whole type.

Grades. Students were grouped by preference opposites (e.g., E and I) to detect differences in academic grades averaged across seven grade terms (last six-week marking period of previous year plus all six terms of the study year) for each core subject. Results are summarized in **Table 6** (See page 66.).

TF and JP were the two type domains that most consistently indicated significant differences between their poles. F preference students received significantly higher grades than T students for four of five core subjects: English, $t(248) = 3.21$, $p = .001$; reading, $t(248) = 3.12$, $p = .002$; science, $t(248) = 2.74$, $p = .007$; and social studies, $t(248) = 2.84$, $p = .005$. Grades of F preference students were also higher in math, though not significantly so, $t(248) = 1.56$, $p = .12$. Students with a preference for Judging (vs. Perceiving) also received significantly higher grades in four subjects: English, $t(248) = 2.48$, $p = .01$; math, $t(248) = 1.87$, $p = .06$; science, $t(248) = 2.30$, p = .02; and social studies, $t(248) = 1.96$, $p = .05$. Reading grades were higher for J students, but not significantly so, $t(248) = 1.00$, $p = .32$. The only other significance preference effect was higher grades for Introverts than Extraverts in science, $t(248) = 1.88$, $p = .06$.

Standardized tests. To explore relationships between type preferences and standardized test performance, repeated measures 2 x 2 ANOVAs (preference x grade level) were conducted for reading and mathematics. Results are shown in **Table 6**. *N* students outscored S students in both math, $F(1, 215) = 6.94$, $p = .01$, and reading, $F(1, 215) = 11.91$, $p = .001$; and P students outperformed J students in reading, $F(1, 215) = 9.47$, $p < .01$. Students with E preferences performed marginally better on the reading TAKS exam than those with I preferences, $F(1, 215) = 3.19$, $p = .08$. No other main effect comparisons were significant, but the interaction of SN and TAKS year was for reading scores, $F(1, 215) = 4.05$, $p = .05$. Students with a preference for N had nearly identical z-scores (means of 0.182 and 0.184) in 5th to 6th grades respectively, while S preference students' means were -0.11 in grade 5, but declined to -0.34 by grade 6.

Ratings of teachers. We also averaged the three different assessments of the three teacher-related items on the student questionnaire and compared the means for type preference opposites. S students rated teachers higher than N students on all three questions: "makes new information easy for me to understand," $t(246) = 2.53$, $p = .01$; "helps me to learn in new ways," $t(246) = 3.48$, $p < .001$; and "helps me come up with good ideas about how to do well on tests," $t(246) = 2.42$, p = .02. The same three items were also higher for J vs. P students: $t(246) = 2.40$, p = .02; $t(246) = 2.12$, $p = .04$; and $t(246) = 2.63$, p = .009, respectively. E and I and T and F students did not rate teachers significantly differently. **Table 7** (See page 67.) summarizes these data.

Table 5. Mean Student Questionnaire Response Changes (Reverse Scored) Over Three Measurements.

Time of Administration										
Pre-type(a)			Mid-type (b)		Year-end (c)		ANOVA		Pairwise Comparisons		
n	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	Groups	*p*	Change
My teacher makes new information easy for me to understand.											
163	2.46[a]	1.01	2.23[b]	0.93	2.15[c]	0.81	13.96	< .001	a b a c	.004 < .001	Increases after measure 1
My teacher helps me to learn in new ways.											
163	2.00[a]	1.04	2.18[b]	0.93	2.21[c]	0.91	4.77	0.03	a b a c	.08 .03	Decreases after measure 1
My teacher helps me come up with good ideas about how to do well on tests.											
161	1.99	1.07	2.11	1.09	2.06	0.99	0.45	0.51	ns		No change
I am comfortable sharing my ideas in class.											
162	3.25[a]	1.18	3.07[b]	1.18	2.90[c]	1.21	11.81	< .001	a b a c b c	.05 < .001 .06	Increases at each measure
I feel comfortable in my classroom.											
161	2.16	1.12	2.11	1.05	2.04	1.01	1.59	0.21	ns		No change
I feel respected in my classroom.											
160	2.68[a]	1.22	2.41[b]	1.18	2.53[c]	1.14	2.76	0.10	a b a c	.004 .10	Increases after measure 1
I am confident I will succeed in this classroom.											
164	1.93	0.98	1.83	1.01	1.80	0.93	1.93	0.17	ns		No change
I know how to successfully complete what is expected of me in my class.											
157	1.85	0.82	1.92	0.97	1.81	0.93	0.18	0.67	ns		No change
I appreciate my own, unique way of learning.											
163	1.95[a]	1.15	1.75[b]	1.04	1.75[c]	0.91	3.4	0.07	a b	.02	Increases after measure 1

Table 6. Mean Academic Grades and TAKS Scores by Type Preference.

Student Preference	Grades						Standardized Z-scores[a]			
	n =	English	Math	Reading	Science	Social Studies	*n* =	5th Gr. Math	6th Gr. Math	5th Gr. Read	6th Gr. Read
Extraversion	147	84.06 (8.98)	79.10 (11.41)	84.47 (7.28)	83.36* (7.29)	83.47 (9.58)	135	-0.04 (1.00)	-0.32 (1.03)	0.10 (0.88)	-0.06 (1.01)
Introversion	103	85.36 (7.94)	81.18 (9.76)	84.98 (5.95)	85.08* (6.89)	85.43 (8.69)	86	-0.05 (1.06)	-0.37 (1.04)	-0.14 (1.07)	-0.25 (0.89)
Sensing	145	85.11 (8.10)	79.98 (10.92)	84.46 (6.97)	84.34 (7.33)	84.43 (9.12)	132	-0.18 (1.02)	-0.47 (0.98)	-0.11 (0.95)	-0.34 (0.93)
Intuition	105	83.88 (9.18)	79.93 (10.66)	84.99 (6.48)	83.69 (6.95)	84.08 (9.49)	85	0.17 (0.99)	-0.14 (1.08)	0.18 (0.95)	0.18 (0.95)
Thinking	109	82.65*** (8.38)	78.75 (10.66)	83.19** (6.17)	82.67** (7.34)	82.42** (8.92)	100	-0.07 (1.10)	-0.44 (1.00)	-0.04 (0.97)	-0.16 (0.90)
Feeling	141	86.10*** (8.45)	80.89 (10.84)	85.84** (6.98)	85.15** (6.86)	85.72** (9.29)	111	-0.02 (0.95)	-0.25 (1.05)	0.05 (0.95)	-0.11 (1.03)
Judging	127	85.91** (7.74)	81.21* (10.36)	85.10 (6.57)	85.08* (6.98)	85.41* (9.16)	117	-0.13 (1.02)	-0.38 (0.94)	-0.19 (0.92)	-0.29 (0.96)
Perceiving	123	83.25** (9.20)	78.66* (11.11)	84.25 (6.95)	83.02* (7.23)	83.12* (9.26)	111	0.05 (1.01)	-0.30 (1.12)	0.21 (0.97)	0.03 (0.96)

*For grades, means in adjacent rows differ significantly as indicated: *p < .06, ** p < .01, *** p < .001*

[a] *For reading standardized z-scores, E > I, p = .08; N > S, p = .001; P > J, p = .002. For math standardized z-scores, N > S, p = .009.*

Note. *Standard deviations are shown in parentheses.*

Self-ratings. **Table 7** (See page 67.) also displays the results for student self-ratings averaged from the three questionnaire administrations. Self-ratings for S students were significantly higher than self-ratings for N students for three items: feeling respected, $t(246) = 2.28$, $p = .02$, confidence of success, $t(246) = 2.43$, $p = .02$, and comfort sharing ideas in class, $t(246) = 1.83$, $p = .07$. Also, compared to students with an I preference, E students reported more comfort in the classroom, $t(246) = 2.04$, $p = .04$, and more comfort sharing ideas, $t(246) = 3.08$, $p = .002$. J students agreed more than P students with the statement "I know how to successfully complete what is expected of me in my class," $t(246) = 2.02$, $p = .04$, and F students agreed more that "I appreciate my own, unique way of learning," $t(246) = 2.11$, $p = .04$. No other comparisons between preference poles produced significant results.

DISCUSSION

In summary, our principal finding indicates that provid-

Table 7. Mean Ratings (Reversed Scored) of Teacher and Self by Type Preference.

E	I	S	N	T	F	J	P
My teacher makes new information easy for me to understand.							
2.30 (0.72)	2.28 (0.78)	2.19** (0.73)	2.43** (0.74)	2.32 (0.73)	2.28 (0.76)	2.18* (0.74)	2.41* (0.74)
My teacher helps me to learn in new ways.							
2.08 (0.74)	2.15 (0.78)	1.97*** (0.71)	2.30*** (0.77)	2.19 (0.75)	2.04 (0.75)	2.01* (0.73)	2.21* (0.76)
My teacher helps me come up with good ideas about how to do well on tests.							
2.04 (0.77)	2.17 (0.88)	1.99* (0.75)	2.24* (0.89)	2.13 (0.85)	2.07 (0.80)	1.96** (0.76)	2.23** (0.86)
I am comfortable sharing my ideas in class.							
2.98** (1.02)	3.37** (0.97)	3.24[a] (0.99)	3.00[a] (1.04)	3.20 (0.94)	3.10 (1.07)	3.22 (1.04)	3.05 (0.99)
I feel comfortable in my classroom.							
2.08* (0.90)	2.32* (0.99)	2.13 (0.94)	2.24 (1.00)	2.19 (0.96)	2.16 (0.93)	2.13 (0.96)	2.22 (0.93)
I feel respected in my classroom.							
2.50 (0.98)	2.66 (1.13)	2.44* (0.97)	2.74* (1.12)	2.60 (1.09)	2.54 (1.01)	2.47 (1.03)	2.67 (1.05)
I am confident I will succeed in this classroom.							
1.89 (0.77)	1.99 (0.95)	1.82* (0.81)	2.09* (0.88)	2.01 (0.87)	1.87 (0.83)	1.84 (0.86)	2.02 (0.84)
I know how to successfully complete what is expected of me in my class.							
1.90 (0.78)	1.95 (0.86)	1.90 (0.79)	1.96 (0.85)	2.01 (0.86)	1.86 (0.77)	1.82* (0.75)	2.09* (0.86)
I appreciate my own, unique way of learning.							
1.81 (0.81)	1.91 (0.95)	1.85 (0.87)	1.87 (0.88)	1.98* (0.95)	1.75* (0.79)	1.79 (0.85)	1.93 (0.89)

*Means in horizontally adjacent columns differ significantly as indicated: *p < .05, **p < .01, ***p < .001, [a]p = .07.*
Note: Standard deviations are shown in parenthesis. Lower scores indicate higher agreement with item.

ing training and support in applying psychological type in the classroom resulted in significant grade improvements for 6th graders compared to prior-year students taking the same courses from the same teachers. Improvements were more apparent for on-level (OL) students; changes in grades in Pre-Advanced Placement (PAP) courses were sometimes negative and always smaller when positive. This difference may reflect a ceiling effect—PAP students have less room for improvement.

In contrast, we found no evidence of a positive impact of the type program on standardized test scores, with the possible exception that math results for PAP math students in the type year did not decline as much from 5th to 6th grade as the results of all other students. The overall trend at our school site was a decline in TAKS reading and math performance between grades 5 and 6 relative to Texas state averages. This also occurred for students attending the school in the year prior to the type program and thus may reflect the influence of other variables, such as changing from an elementary school to a middle school.

The higher performance of prior-year students was evident in both the 5th and the 6th grade results and may reflect existing performance differences between the two cohorts. In post-study interviews, teachers suggested that the type-year students, on average, were not as academically capable as the prior year's cohort. Chi-square analyses support this observation: a significantly higher proportion of prior-year students, compared to type-year students, were enrolled in PAP courses in the two subjects tested in the TAKS exams, x^2 (1, N = 457) = 28.60, $p < .001$ for reading, and x^2 (1, N = 459) = 34.42, $p < .001$ for math. Additional supportive evidence comes from the comparison of standardized test results scores for students in our study year versus prior-year students. For both math and reading, prior-year students significantly outperformed the type-year cohort, but these differences were not significant when using the previous year standardized scores as a covariate. Thus, other confounding factors may have masked any effect of type training.

If indeed our type-year students were on average less academically gifted, then their improved grades are even more impressive. Grades may be more responsive to short term initiatives, or incorporate non-academic considerations like behavior and participation, than the more aptitude-oriented standardized test scores. As grade performance was never presented to teachers as goal of the type program, demand characteristics (i.e., awarding higher grades to fulfill expectations) are a possible but unlikely explanation of the results.

The operation of confounding influences such as history, maturation, and differences in our comparison groups are inherent in the limitations of our design (Campbell & Stanley, 1969). Thus, while Campbell and Stanley deem such research "worth doing" when an experimental design is not practical, our interpretations of results are limited to speculation. Future research will benefit by the use of random assignment of teachers and/or students to type training or control conditions, which was not an option for this research site.

Differences in academic performance and attitudes towards teachers and schools between students of different types and preferences are less vulnerable to such issues and may be interpreted with more confidence. We found several such differences. For example, students who preferred Perceiving instead of Judging scored significantly higher on the standardized reading exam, while J students earned higher grades in every subject but reading. This is consistent with previous findings—Myers and McCaulley (1985), for example, note that "P types . . . average somewhat higher on aptitude tests than do J types, whereas J types average somewhat higher in grades" (p. 96). A possible explanation of this difference is that J students overcome their aptitude deficiency with a more organized, goal-oriented approach to learning. Atman (1993) found a strong preference for higher goal orientation for J types compared to P types, both in adults and in a similarly aged sample of junior high school students.

As noteworthy as J students in receiving higher grades, Feeling preference students significantly outperformed T students in English, reading, science, and social studies. This pattern departs from previous research summaries (for example, Myers & McCaulley, 1985, pp. 113–114), where, if anything, T students showed a slight advantage over Fs. Although Atman (1993) did not look at academic performance, she did find a similar, highly relevant TF reversal regarding goal orientation. Adult T types were more goal oriented than F types, but the opposite was true for junior high school students. As most of the research on type and academics has primarily focused on college samples, and to a lesser extent on high schools, there are relatively few studies on younger children to inform us as to how type development from an early age impacts the learning experience. The present study offers additional middle school data that begin to address the relative lack of

results for younger students. Further research is necessary to understand whether an F-preference might be an academic advantage prior to high school.

Students with a preference for Intuition outperformed Sensing students on both math and reading TAKS, but their grades were not significantly different. These findings are also consistent with past research (see in particular DiTiberio, 1998, pp. 266–267) indicating a strong, consistent relationship between standardized test performance and Intuition. Our data suggest that the academic advantage usually associated with Intuition may be detectable earlier with standardized tests than with grades, though again additional research is needed to warrant such a conclusion.

Despite earning higher TAKS scores, N students were less positive than S pupils when rating their teachers and school experience. In addition, S students reported feeling more respected, more comfortable sharing ideas, and more confident of success. Here again is an intriguing suggestion of type development's relevance to learning, as previous research (e.g., Schaefer, 1994) has found a positive relationship of N with academic self-esteem in 11th and 12th graders.

Our result may also be related to the school studied, where the overwhelming majority of teachers preferred S (77%) over N. The preponderance of teachers favoring F over T (69% vs. 31%) and J over P (78% vs. 22%) also corresponds to differences observed in student grades and ratings for students of the same preferences as their teachers. Thus, compared to T students, F pupils earned higher grades and also reported greater appreciation of their personal learning styles. J students rated their teachers more positively, and reported more "know how" for achieving success in school. As data from a single test site preclude any definitive conclusions, further research will be necessary to determine whether variations in teacher and student type distributions correspond reliably to grades or ratings of the learning environment.

We found significant improvements over the course of the school year in how respected students reported feeling, how comfortable they were sharing ideas in class, and how much they appreciated their "own unique way of learning"—essentially learning style. These positive ratings could be attributable to the type program, or simply to acclimation over the school year. This competing explanation, however, is not supported by data from a 6th grade class at another public school in the same district, which showed a decline in these ratings over the same time span.

Students' ratings of their teachers' ability to "make new information easy for me to understand" also improved over the school year. In contrast, agreement with the item "my teacher helps me to learn in new ways" showed a significant decline. These results suggest that teachers are more able to alter information to accommodate a student's learning style than to actually alter the style itself.

LIMITATIONS: As mentioned in the introduction, reviews of the literature (Hall, 2002; Pashler et al., 2008) show little evidence for the efficacy of learning style in the classroom. This study is a small step in the right direction. However, unknown differences in two different student cohorts measured in two different school years render any conclusions tentative, as do the limitations of a non-experimental design. Additionally, as Pashler et al. (2008) argue, a full test of the learning style model requires a demonstration that any given teaching or learning style be more effective with some students and less effective with others. Current research is underway or planned to address these limitations and to explore the use of psychological type to identify and leverage learning styles to improve student learning.

Footnotes

1. Copies of student and teacher questionnaires are available upon request from the senior author.
2. In all analyses of grades, students in advanced courses significantly outperformed students in standard level courses. We do not report these differences in subsequent discussions as such findings are both obvious and not directly relevant to the goals of this study.

REFERENCES

Atman, K. S. (1993). Goal accomplishment and psychological type: Cultural variations. In R. A. Moody (Ed.), *Psychological Type and Culture—East and West: A Multicultural Research Symposium* (pp. 207–220). University of Hawaii, January 1993. Gainesville, FL: Center for Applications of Psychological Type.

Barsch, J. (1991). *Barsch learning style inventory.* Novato, CA: Academic Therapy Publications.

Bravmann, S. (2004). *Two, four, six, eight, let's all differentiate. Differentiated education: Yesterday, today, and tomorrow.* Retrieved from http://www.newhorizons.org/strategies/differentiated/bravmann.htm

Campbell, D. T. & Stanley, J. C. (1969). *Experimental and quasi-experimental designs for research* (4th printing). Chicago, IL: Rand McNally.

Carbo, M. (1995). *Educating everybody's children.* In R. W. Cole (Ed.), Educating everybody's children: Diverse teaching strategies for diverse learners. Alexandria, VA: Association for Supervision and Curriculum Development.

City-data.com. (2010). Data retrieved from http://www.city-data.com/housing/houses-Watauga-Texas.html

Cohen, J. (1988), *Statistical power analysis for the behavioral sciences* (2nd ed.) New York: Academic Press.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in post-16 learning. A systematic and critical review.* London: Learning and Skills Research Centre.

DiTiberio, J. K. (1996). Education, learning styles, and cognitive styles. In A. L. Hammer (Ed.), *MBTI applications: A decade of research on the Myers-Briggs Type Indicator* (pp. 123–166). Palo Alto, CA: Consulting Psychologists Press.

DiTiberio, J. K. (1998). Uses of type in education (revised chapter). In I. B. Myers, M. H. McCaulley, N. L. Quenk, A. L. Hammer (Eds.), *MBTI® Manual: A guide to the development and use of the Myers-Briggs Type Indicator®* (3rd ed., pp. 253–284). Palo Alto, CA: Consulting Psychologists Press.

Dunn, R. S. & Dunn, K. J. (1998). *Complete guide to the learning styles in service system*. Upper Saddle River, NJ: Prentice Hall.

Fischetti, B. A. & Mentore-Lee, J. L. (2001). Personality type and teaching: A preliminary investigation. *Bulletin of Psychological Type, 24*(3), 6, 8.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gilbert, A. P. (1998). *A test-retest study of the Myers-Briggs Type Indicator (MBTI) and the Murphy-Meisgeier Type Indicator for Children® (MMTIC®) over a two year time period*. (Doctoral dissertation, Ohio State University, 1998). Dissertation Abstracts International, 59(05), 1457A (University Microfilms No. AAG98-33981).

Hall, T. (2002). *Effective classroom practices report: Differentiated instruction*. National Association on Accessing the General Curriculum, U.S. Office of Special Education Programs. Retrieved from http://4.17.143.133/ncac/index.cfm?i=2876

Jung, C. G. (1971). Psychological types. In *Collected Works, Vol. 6*. Princeton, NJ: Princeton University Press. (Originally published in German as *Psychologische Typen*, Rasher Verlag, Zurich, 1923.)

Kise, J. A. G. (2004). Using type at an urban middle school: Building relationships and improving student performance. *MBTI Type Today, 1*(1). Retrieved from http://www.mbtitoday.org/articles/article03.html

Kise, J. A. G. (2007). *Differentiation through personality types: A framework for instruction, assessment, and classroom management*. Thousand Oaks, CA: Corwin Press.

Kolb, D.A. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. (1985). *Learning style inventory*. Boston: McBer.

Lang, M. L. S. (1999). *A concurrent validity study of the MBTI, MMTIC®, and SSQ with middle school students* (Doctoral Dissertation, Texas Woman's University, 1999). Dissertation Abstracts International, 60(09), 3271A. (University Microfilms No. AAI99-44500.)

Lawrence, G. D. (1984). A synthesis of learning style research involving the MBTI. *Journal of Psychological Type, 8*, 2–15.

Lawrence, G. D. (2009). *People types and tiger stripes: Using psychological type to help students discover their unique potential* (fourth edition). Gainesville, FL: CAPT.

Macdaid, G. P., McCaulley, M. H., & Kainz, R. I. (1986). *Myers-Briggs Type Indicator: Atlas of type tables*. Gainesville, FL: Center for Applications of Psychological Type.

Mills, C. J. (2003): Characteristics of effective teachers of gifted students: Teacher background and personality styles of students. *Gifted Child Quarterly, 4*(4), 272–281.

Murphy, E. (2008) *Exploring Personality Type with the MMTIC Discovering My Strengths and Stretches*. Gainesville, FL: CAPT.

Murphy, E. & Meisgeier, C. (2008). *MMTIC® Manual: A Guide to the development and use of the Murphy-Meisgeier Type Indicator for Children®*. Gainesville, FL: CAPT.

Myers, I. B. (1962). *Manual: The Myers-Briggs Type Indicator®*. Princeton, NJ: Educational Testing Service.

Myers, I. B. & McCaulley, M. H. (1985). *Manual: A guide to the development and use of the Myers-Briggs Type Indicator* (2nd ed.). Palo Alto, CA: Consulting Psychologists Press.

Myers, I. B., McCaulley, M. H., Quenk, N. L. & Hammer, A. L. (1998). *MBTI® Manual: A guide to the development and use of the Myers-Briggs Type Indicator®* (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.

Myers, I. B., with Myers, P. B. (1980). *Gifts differing*. Palo Alto, CA: Consulting Psychologists Press.

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest, 9*(3), 105–119.

Rushton, S., Knopp, T. Y., & Smith, R. L. (2006). Teacher of the Year award recipients' Myers-Briggs personality profiles: Identifying teacher effectiveness profiles toward improved student outcomes. *Journal of Psychological Type, 66*(4), 23–34.

Schaefer, G. L. (1994). *Relationship of Myers-Briggs Type Indicator personality profiles to academic self-esteem* (Doctoral dissertation, University of the Pacific, 1994). Dissertation Abstracts International, 55(05), 1228A. (University Microfilms No. AAC94-26390)

Swiatek, M. A. (2001). *Ability grouping: answers to common questions*. Retrieved from http://www.cmu.edu/cmites/abilitygrouping.html

Ward, V. (1961). *Education for the gifted: An axiomatic approach*. Columbus, OH: Charles E. Merrill Books, 1961.

Robert W. McPeek is the Director of Research for the Center for Applications of Psychological Type. He received his Ph.D. in social psychology from Ohio State University, where he developed an abiding interest in personality measures. His research has been published in the *Journal of Consulting and Clinical Psychology*, *Journal of Applied Social Psychology*, *Motivation and Emotion*, *Journal of Social Psychology*, and *Journal of Psychological Type*.

David F. Holland is currently the Director of Accountability, Research and Program Evaluation in Birdville ISD in Haltom City, Texas. He received a Bachelor of Science degree in biology and education from Michigan State University and a Master of Science in biology from The University of Texas at Arlington.

Judith F. Breiner is currently Director of Research Operations at the Center for Applications of Psychological Type. She spent five years as a facilitator for the development of the MBTI® Step III™ instrument and is interested in its application in research. Other research interests include the relationship of type to human psychological and biological development across the age span. She has published her research in the *Transportation Research*, *Journal of School Health*, *Brain Research*, and other journals. She holds a Ph.D. in pharmacology from the University of Florida, College of Medicine.

Chris Urquhart holds two Master's degrees, one in education from Indiana University of Pennsylvania and one in counseling and educational administration from Texas Christian University. She's been recognized twice by the Birdville Independent School District (Haltom, Texas) as Teacher of the Year and is a 3-time recipient of the Texas Counselors Reinforcing Excellence Award. She has presented at TCA and Association of Psychological Type International conferences and published in the *Bulletin of Psychological Type* and *Professional School Counseling*.

David Cavalleri is the Director of Research for the Center at the Health Council of East Central Florida. He is a doctoral candidate in Marriage and Family Counseling at the University of Florida. He received a Master of Science in Counseling Psychology from the University of Florida.

CONTACT

Robert W. McPeek, Ph.D.
2815 NW 13th Street, Suite 401
Gainesville, Florida 32609

352.375.0160
bob@capt.org

This *Journal* is being made available through the collaborative efforts of Dr. Tom Carskadon, Founding Editor of the *Journal of Psychological Type®*, and the Center for Applications of Psychological Type, Inc., CAPT, worldwide publisher. The Journal of Psychological Type's editorial staff includes Dr. Robert W. McPeek, Editor, Dr. Judith F. Breiner, Managing Editor, and Dr. Elisa Maranzana, Associate Editor.