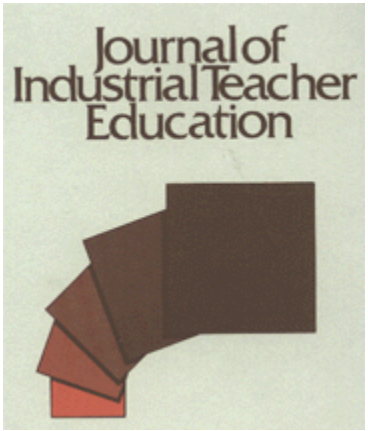

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Preferred Learning Styles of Postsecondary Technical Institute Instructors

Dale E. Thompson
University of Arkansas

Betsy Orr
University of Arkansas

Cecelia Thompson

University of Arkansas

Ok Park
University of Arkansas

Teachers teach according to the way they learn; therefore, it is important to learn more about teachers' learning styles. According to Butler (1987), every teacher has a personal learning style. Teachers teach to their own learning style for many reasons (Stewart, Jones, & Pope, 1999). Teachers will teach to the way that they feel most comfortable and may have difficulty understanding those who have different learning styles. One teacher may use abstract examples while others may use concrete illustrations. Likewise, students learn according to the learning style with which they feel most comfortable. Teachers must understand their own learning style but must use a variety of ways to accommodate the learning styles of their students.

No one particular learning style is superior to another. Learning styles are not related to intelligence, mental ability, or actual learning performance (Griggs as cited in Gordon, 1998). Learning style is defined as "a set of factors, behaviors, and attitudes that facilitate learning for an individual in a given situation" (Reiff, 1992, p. 7). Mills (1999) identifies learning style as our perceptions of our natural learning strengths. Gregorc (1985a) states that learning styles are "behaviors, characteristics, and mannerisms which are symptoms of mental qualities used for gathering data from the environment" (p. 179). Gregorc (1982a) recognizes that every human being has both universal qualities common to all others as well as unique attributes. "Each person is unique and complex, and yet each person is predictable, too. It's the predictable side of people that announces their style" (Guild & Garger, 1985, p. 3). These predictable, common patterns form our typical approaches to life tasks and make up our individual styles (Hand, 1992).

"Once teachers learn how their students learn, they can match individuals' learning styles with the method most responsive to that style" (Dunn, 1999, p. 51). Matching teaching style to student learning style promotes learning in a less stressful environment for students and results in greater student achievement (Butler, 1987). A short period of mismatching may result in new and varied experiences, and too much matching can lead to boredom (Reiff, 1992).

Gregorc (1982a) outlines four learning/teaching channels: concrete sequential, abstract sequential, abstract random, and concrete random. Gregorc & Butler (1984) believe all individuals possess some natural ability in the four channels; however, most individuals possess natural ability in one of the channels more than the others.

Concrete sequential individuals relate best to the physical, hands-on world and think in ways that are methodical, ordered, and predictable (Gregorc, 1982a). They prefer hands-on activities and may also have a tendency for perfection. Abstract sequential individuals mentally outline, correlate and compare, and categorize data in a manner unsurpassed by other styles using their analytical abilities (Gregorc, 1982a). They prefer guided assignments and detailed plans, as well as nonrestricted environments. Abstract random individuals prefer order that is nonlinear, harmonious, and non-traditional (Gregorc, 1982a). They have the natural ability to work well with people (Gregorc & Butler, 1984). These individuals work best when allowed to be creative and display their emotions. Concrete random individuals are intuitive, insightful, and easily make transitions from fact to theory (Gregorc, 1982a). Concrete random individuals may be risk takers, investigative, and experimental (Butler, 1987). These individuals prefer a busy environment, to be around many types of people, and they enjoy the role of mentor.

Some people are strong in one learning style. However, many individuals have strengths in two learning styles. These bimodal individuals are able to operate effectively in more than one channel. Their learning preferences are more varied which increases

their ability to relate to different students and classroom environments.

Some studies have examined the relationship between instruction and student learning style. To accommodate adult students in two-year postsecondary institutions the congruence between teaching strategies and students learning styles must be examined (Gusentine & Keim, 1996). In a study of 16 faculty members at two campuses, O'Brien and Thompson (1994) found that when students exhibiting a concrete random style were taught by a concrete random teacher, they were assigned higher grades. However, students with other learning styles did better when their teacher's learning style did not match their style. Concrete sequential, abstract sequential, and abstract random students tended to receive higher grades when their learning style was mismatched with their teachers.

A study by Boulmetis and Sabula (1996) of 63 nursing students found that when instruction matched learning style, scores were significantly higher on a nutrition achievement test. A case study by Wheeler (1991) found that an unsatisfactory experience developed when the learning style of a student teacher was mismatched with the learning style of the cooperating teacher. Garity (1985) suggested that when teachers' learning style was matched with students learning style, student failure rate decreased.

Purpose of the Study

Few studies have investigated the learning styles of postsecondary faculty. The purpose of this study was to determine if there was a predominant learning style among postsecondary instructors at technical institutes in Arkansas as measured by the Gregorc Style Delineator. The secondary purpose was to determine if there were significant differences in learning styles among instructors with different characteristics, including program area, gender, and work experience.

Method

Population

The population consisted of all postsecondary instructors in the nine postsecondary technical institutes in Arkansas. These nine institutes are located throughout the state; two in northwest Arkansas; four in northeast Arkansas; one in southwest Arkansas, and two in southeast Arkansas. The institutes were postsecondary schools offering 1 to 2 year vocational training programs. A total of 224 instructors were employed at the technical institutes. The instructors' teaching areas included basic skills (communications and math); adult education (adult basic education and general adult education); business education (accounting, computer information systems, computer applications, finance, business technology, and data processing); health occupations (practical nursing, dental assisting, surgical technology, medical records technology, respiratory care, emergency medical services, and nurse technician); trade and industrial education (welding, electronic technology; air conditioning and refrigeration, auto body repair and painting, truck driving, machine shop, automotive services, drafting, industrial equipment technology, major appliance service, residential construction, diesel technology, and tool and die technology); and related fields, including administrators. All 224 instructors were invited to participate in this study.

A total of 154 instructors at the nine postsecondary technical institutes chose to participate (69%). Fifty-five (35.7%) were trade and industrial instructors; 30 (19.5%) were business education instructors; 21 (13.6%) were academic instructors; 19 (12.3%) were health occupations and adult education instructors; and 10 (6.5%) were from related areas. The majority of the participants were female (87, 56.5%), compared to 67 (43.5%) male participants. The majority of the participants (91, 59.1%) had over 21 years

of work experience, 48 (31.2%) reported 11 to 20 years of work experience, and 14 (9.1%) had been working 1 to 10 years. Only one participant reported having no work experience.

Instrumentation

The Gregorc Style Delineator (Gregorc, 1985b) was used for this study because it is a research-based self-analysis instrument for adults and because the results are easy to understand. The instrument contains a word matrix, which is the means for identifying a person's learning style. In addition to the matrix it contains key ideas about learning styles, the purpose of the style delineator, and characteristics of the four mediation channels.

The word matrix consists of ten groups of words. Each group contains four words, and the respondents rank them 4, 3, 2, and 1, with 4 being the most descriptive and 1 being the least descriptive. The words are indicators of the four learning styles: concrete sequential, concrete random, abstract sequential, and abstract random. To rank order the words in a set, the respondents were asked to react to their first impression. There were no right or wrong answers. The pre-arranged word matrix in the instrument determined the total score for each learning style area. A total score of 27 to 40 points indicated a dominant learning style. Intermediate style scores ranged from 16 to 26 points and low style scores ranged from 10 to 15 points. The reliability of the instrument was assessed in terms of internal consistency using standardized alphas and in terms of stability using a testretest correlation coefficient. The standardized alpha range is 0.89 to 0.93. The correlation coefficients between the first and second test range were from 0.85 to 0.88 for the four scales (Gregorc, 1982b).

Data Collection

The researchers conducted a voluntary in-service workshop at each technical institute, which was available to all instructors. After explaining the purpose of the delineator and giving instructions regarding completing the instrument, instructors were asked to score the Gregorc Style Delineator matrix. The researchers adhered to the instructions provided by the *Gregorc Style Delineator: Development, Technical and Administration Manual* (Gregorc, 1982b) while administering the instrument. Scores were transferred to a learning styles summary sheet. Instructors also recorded their program area, gender, and years of work experience on the summary sheet. Instructors were not identified by name or school; only group data are reported in this study.

Based on the scores, instructors were categorized as dominant in a learning style area. Some instructors were designated as bimodal when they were dominant in two learning style categories in which the two highest scores were within five or less points of each other. A trimodal designation was assigned to those dominant in three categories (Gregorc, personal communication, May 28, 1997).

Data Analysis

Data were analyzed using the SPSS statistical computer package (Statistical Package for the Social Sciences, version 9, 1997) and only those cases with complete data were analyzed (n=154). Data were coded and entered with double data/entry/coding procedures to ensure a high accuracy rate. Several procedures, including frequency, mean, and analysis of variance (ANOVA) were performed to summarize unvaried findings and to test bivariate relationships. Tabulations and percentages were calculated to determine the respondents' predominant learning styles. Chi-square tests were conducted to determine if program area was associated with learning styles. T-test and ANOVA analyses were performed to test for statistically significant differences between

program area, work experience, and learning styles.

Findings

Predominant Learning Style

The major purpose of our study was to determine if there was a predominant learning style of instructors in trade and industrial, business education, academic areas, adult education, health occupations, and related areas. Of the 154 cases, 77 (50%) were unimodal; 70 (45.5%) were bimodal, with dominance in two learning style categories; and 7 (4.6%) were trimodal. For all respondents, including those who were bimodal and trimodal, the concrete sequential style was found to be the predominant learning style. In this study, all instructors reported having at least one dominant area (see Table 1).

For all respondents, 46 (29.9%) have a unimodal dominant style of concrete sequential. Following, in order of learning style magnitude, are concrete random (15 or 9.7%); abstract random (13 or 8.4%); and abstract sequential (3 or 1.9%). Of the 77 respondents with a unimodal learning style, 59.7% were concrete sequential, 19.5% were concrete random, 16.9% were abstract random and 3.9% were abstract sequential.

The concrete sequential mean score for all six program areas was 28.99 (out of 40 possible). Overall, the academic program area instructors had the highest concrete sequential mean score (30.19) followed by trade and industrial (29.82), business education (28.80), related areas (27.80), adult education (27.42), and then health occupations (27.79). The mean scores and standard deviations for teachers in each program area and for each learning style are shown in Table 2.

Learning Styles by Program Area

As shown in Table 1, of the 46 instructors whose dominant learning style was concrete sequential, 16 were in trade and industrial, 12 were in business education, 8 were in academic classes, 5 were in health occupations, 3 were in adult education, and 2 were in the related areas category. Four out of eight adult education instructors who were dominant in a single style identified abstract random as their dominant learning style.

As shown in Table 3, of the 70 instructors indicating bimodal scores, 25 were in trade and industrial, 12 were in business education and health occupations, 9 were in adult education, and 6 were in academic and related areas. The most common pairing in trades and industrial, business education, and adult education was concrete sequential/abstract sequential. Concrete sequential/abstract random was the most common pairing among academic and health occupations instructors.

Table 1
Frequency and percentage of learning style and program areas

Learning Styles	T & I	Business Education	Academic	Adult Education	Health Occupations	Related Areas	n	%
Concrete Sequential	16	12	8	3	5	2	46	29.9

Abstract Sequential	1	0	1	0	1	0	3	1.9
Abstract Random	4	1	3	4	0	1	13	8.4
Concrete Random	7	3	2	1	1	1	15	9.7
Bimodal	25	12	6	9	12	6	70	45.5
Trimodal	2	2	1	2	0	0	7	4.6
Total	55	30	21	19	19	10	154	100

Table 2
Mean and standard deviation for learning style and program area.

Learning Styles	**T & I**	**Business Education**	**Academic**	**Adult Education**	**Health Occupations**	**Related Areas**	**Overall**
	Mean SD	**Mean SD**	**Mean SD**	**Mean SD**	**Mean SD**	**Mean SD**	**Mean SD**
Concrete	29.82	28.80	30.19	27.42	27.79	27.80	28.99
Sequential	5.10	6.12	5.34	5.81	5.97	6.39	5.62
Abstract	25.40	24.23	23.95	22.74	23.95	22.50	24.28
Sequential	4.32	4.92	3.72	5.09	4.86	5.13	4.82
Abstract	20.86	24.40	24.71	26.69	25.37	26.90	23.74
Random	5.53	5.79	4.44	5.40	4.03	6.67	5.74
Concrete	23.93	22.57	21.14	23.16	22.89	22.80	22.99
Random	5.65	5.24	5.26	6.36	6.71	5.85	5.74

Table 3
Bimodal pairings by program areas and gender

Program Area and Gender	**CS/ AS**	**CS/ AR**	**CS/ CR**	**AS/ AR**	**AS/ CR**	**AR/ CR**	**Total**
T & I	14	3	7	0	1	0	25

Business Education	4	3	0	1	1	3	12
Academic	2	3	1	0	0	0	6
Adult Education	4	2	0	0	0	3	9
Health Occupations	2	4	2	0	1	3	12
Others	1	3	0	0	0	2	6
Total	27	18	10	1	3	11	70
Female	13	17	3	1	1	9	44
Male	14	1	7	0	2	2	26

Of the 70 instructors with bimodal scores, more females were dominant in two learning styles than males. The most common paring for females was concrete sequential-abstract random, while concrete sequential was the most common for males (see Table 3).

In order to find significant differences among the program areas, the chi-square test was performed. For this test, the number of bimodal instructors was added to each category to reflect the total numbers in that particular category (see Table 4).

Table 4
Frequency and percentage of learning styles of single area dominant and bimodal instructors by program areas.

Learning Style	**T & I**	**Business Education**	**Academic**	**Adult Education**	**Health Occupation**	**Related Areas**	**Overall**
	***n*=55**	***n*=30**	***n*=21**	***n*=19**	***n*=19**	***n*=10**	***n*=154**
	***n* %**	***n* %**	***n* %**	***n* %**	***n* %**	***n* %**	***n* %**
Concrete	44	21	15	11	14	6	111
Sequential	80.00%	70.00%	71.43%	57.89%	73.68%	60.00%	72.08%
Abstract	56	2	5	7	6	11	25
Sequential	45.45%	36.67%	28.57%	36.84%	26.32%	20.00%	36.36%
Abstract	8	10	7	11	7	6	49
Random	14.55%	33.33%	33.33%	57.89%	36.84%	60.00%	31.82%
Concrete	18	8	4	5	7	3	45
Random	32.73%	26.67%	19.05%	26.32%	36.84%	30.00%	29.22%

Note: Totals and percentages exceed 100% because of the inclusion of two learning styles for bimodal respondents.

The results of the test indicated that the program areas did not differ significantly in the proportion of instructors in the concrete sequential category (x^2 (2) = 4.43; p = .49). The same was true in the category of abstract sequential (x^2 (2) = 4.5; p = .48). The program areas differed significantly in the proportion of the abstract random category (x^2 (2) = 17.46; p = .004). Follow-up analysis revealed that the trade and industrial instructors group was significantly lower in this category than the other groups of instructors. There was no significant difference in the proportion of concrete random category (x^2 (2) = 2.09; p = .84).

Learning Styles by Work Experience

There was a significant difference between groups on concrete sequential learning style. The mean score was greatest for instructors with 21 years or more of work experience (see Table 5). The results of the ANOVA performed on years of work experience and learning style indicated significant differences between instructors with years of work experience and the concrete sequential learning style (see Table 6). The data did not reveal significant differences at the .05 level with the other three learning styles.

Table 5
Mean and Standard Deviation for Learning Style and Work Experience

	Work Experience				
Learning Styles	**None Mean/SD**	**1 to 10 Mean SD**	**11 to 21 Mean SD**	**21 or More Mean SD**	**Overall MeanSD**
Concrete Sequential	33 / *	28.07 / 4.71	27.35 / 5.86	29.96 / 5.46	28.99 / 5.62
Abstract Sequential	31 / *	23 / 5.86	24.23 / 4.62	24.43 / 4.4	24.28 / 4.62
Abstract Random	23 / *	24.86 / 6.2	24.36 / 5.83	23.2 / 5.67	23.74 / 5.74
Concrete Random	13 / *	24.07 / 6.45	24.04 / 5.71	22.37 / 5.55	22.99 / 5.74

* One instructor reported no work experience.

Table 6
Analysis of Variance for Learning Style and Work Experience

Learning Style	Mean Squares	F Ratio	P Value
Concrete Sequential:			
Between Groups	80.42	2.63	0.052
Within Groups	30.59		
Abstract Sequential:			
Between Groups	23.41	1.1	0.351
Within Groups	21.29		
Abstract Random:			
Between Groups	19.99	0.602	0.615
Within Groups	33.22		
Concrete Random:			
Between Groups	67.94	2.11	0.102
Within Groups	32.28		

Table 7
Mean and Standard Deviation for Learning Style and Gender

Style and Gender	Mean	SD	P Value	T
Concrete Sequential:				
Female	28.72	5.71	0.498	-0.68
Male	29.34	5.52		
Abstract Sequential:				
Female	23.6	4.74	0.034*	-2.14
Male	25.16	4.33		
Abstract Random:				
Female	25.45	4.83	0*	4.33
Male	21.52	6.1		
Concrete Random:				
Female	22.23	5.96	0.059	-1.91
Male	23.97	5.34		

Note: Males n = 67; females n = 87; *p>.05

Learning Styles by Gender

As noted in Table 7, t-tests revealed significant differences between genders in the abstract sequential and abstract random. In the categories of concrete sequential, abstract sequential and concrete random, the mean score for the males was higher than females. In the category of abstract random, the mean score for females was higher than males.

Discussion and Implications for Practice

Within this group of postsecondary instructors two distinct and equal groups emerged. One group was dominant in a single style (50%) while the other group was dominant in more than one style (50%). Of those dominant in only one learning style, the majority scored highest in concrete sequential learning style. The mean concrete sequential score was dominant (<27) for all program areas.

If, as Stewart, Jones, and Pope (1999) report, teachers teach to their own style, then many postsecondary instructors tend to teach with a focus on concrete sequential, which is practical and predictable. They will be tothe- point, organized and structured. They will deal with the physical handson world and tend to be naturals at devising schedules, keeping records, and developing projects and learning centers.

The second group was dominant in more than one learning style. Of this group, the largest numbers of instructors dominant in more than one area were concrete sequential/abstract sequential. Dominance in more than one area would be an advantage for instructors and students. Instructors would be more comfortable in adapting their instructional methods and they would be better able to identify students' learning styles. The concrete sequential-abstract sequential pairing would combine strengths of practical/hands-on and a conceptual focus, which would be beneficial for instructors in a technical college. An instructor with strengths in these areas would be able to explain the relationship of a particular process to the whole and to demonstrate the actual process.

The dominant learning style of postsecondary technical instructors was concrete sequential regardless of the teaching area. However, there was a diversity of styles in all teaching areas. Knowledge of preferred learning styles would allow instructors to see how they perceive the world and their teaching environment.

Significant differences were found in three areas of the data. First, trade and industrial instructors scored lower in the abstract random domain than other instructors. These instructors had several years of work experience in industry. Their content area and job experiences would have been very structured with detailed procedures. However, they would have to be skilled in problem solving. These structured job requirements may contribute to their lower scores in the abstract random domain.

Second, all instructors with more than 21 years of work experience scored higher in the concrete sequential domain than other instructors. This may suggest that those who enter teaching late in their careers tend to be more concrete sequential. This is consistent with the findings of Orr, Park, Thompson & Thompson (1999) that there is a significant relationship between years of work experience and the concrete sequential learning style.

Finally, male participants were significantly higher in abstract sequential and females were significantly higher in abstract random. This disputes O'Brien's (1994) suggestion that males are more concrete and females are far more abstract. In this study, instructors of both genders were abstract.

Teachers must take the initiative to meet the learning needs of students. For example, they might administer the Brookfield (1990) Critical Incident Questionnaire midway through the semester. The questionnaire allows students to report if their learning needs are being met. After reviewing the results, an instructor may need to provide activities that accommodate a greater variety of learning styles.

Faculty in college teaching should be encouraged to reflect on their own learning preferences and how these preferences match the needs of learners. "There is enough variety in the learning styles of postsecondary students that teachers should recognize the importance of accommodating and encouraging students with different learning styles" (Orr, Park, Thompson & Thompson, 1999, p. 18).

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Thompson (thomp@uark.edu) is Assistant Professor, Orr (borr@uark.edu) is Associate Professor, Thompson (cthomps@uark.edu) is Professor, and Park (okpark@uark.edu) is Associate Professor in the Area of Vocational and Adult Education at University of Arkansas in Fayetteville, Arkansas.

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