Comparison of Learning Styles Between Traditional and Nontraditional Pharmacy Students in a Doctor of Pharmacy Program

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ABSTRACT. This paper reports an evaluation of learning styles among traditional and nontraditional Doctor of Pharmacy students. The results are based on a 12-item validated questionnaire, the Kolb Learning Style Inventory. Fifty-six traditional students were surveyed during their third professional year, prior to beginning senior clerkship experiences. Seventy-six nontraditional students completed the inventory in a similar fashion just prior to entering clerkship experiences. The results were similar, with the majority of both groups exhibiting learning styles of an assimilator. The traits of four learning styles are discussed, as are teaching and study strategies which may improve learning by the pharmacy student. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworth.com]*

INTRODUCTION

The Kolb Learning Style Inventory (LSI) was developed to provide a framework to assess an individual's learning strengths and weaknesses (1).

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Kolb identified four types of learning abilities: (1) concrete experience (CE)–feeling, (2) reflective observation (RO)–watching, (3) abstract conceptualization (AC)–thinking, and (4) active experimentation (AE)–doing. A forced-choice ipsative scale is used to generate a score on each learning style. By combining two of these scores, the inventory also indicates an individual's preference for abstractness over concreteness (AC − CE) or for action over reflection (AE − RO) (1). By plotting these two values, individuals fall into one of four learning style categories: Assimilator, Converger, Diverger, or Accommodator. The Diverger style uses a combination of concrete experience and reflective observation. The Converger prefers abstract conceptualization and active experimentation. The Assimilator relies upon reflective observation and abstract conceptualization, and the Accommodators use active experimentation and concrete experience. Although individuals may fall into any category with characteristic strengths and weaknesses, students have been shown to learn more effectively if they develop learning skills in identified areas of weakness (2).

The purpose of this study was to determine the learning styles of traditional and nontraditional Doctor of Pharmacy students in order to examine differences. It also considered whether differences in learning styles exist among nontraditional students, based on gender, age, and practice site. Making students aware of their individual learning styles enables them to identify their strengths in the learning cycle. More importantly, it can be helpful in increasing their effectiveness as learners by improving the steps which they underuse.

LEARNING STYLES

The four learning styles are further described as follows:

Diverger. An individual with this style bases learning on personal involvement through personal experiences and reflection. Divergers are usually creative and good at understanding and relating with people. A weakness of this learning style includes the inability to make decisions, or to be paralyzed by decision making. Divergers often find careers in the arts as musicians, designers, or actors. They are also found in service organizations in roles such as counselors, therapists, social workers, or nurses.

Assimilator. Assimilators are likely to be more interested in the logical soundness of an idea than in its practical application. They are best at understanding a wide range of information and systematically arranging it. A weakness of this learning style is the potential inability to make practical applications based on acquired knowledge. Assimilators are most com-

monly seen in information and science fields as writers, planners, researchers, academic physicians, or teachers.

Accommodator. This learning style is characterized by learning primarily through "hands-on" application. Accommodators tend to act on feelings rather than logic. Risks from excessive application of this trait are the potential to use up energy on trivial improvements, or to finish the wrong project. A strength of this learning style is the ability to get things done and to take risks. Individuals with this learning style are often found in such business fields as banking, administration, accounting, sales, and management.

Converger. Convergers favor the practical application of ideas, do well on conventional tests, and are good decision-makers. A potential weakness of this style is that convergers may make decisions too hastily. Technologists, engineers, physicians, farmers, and computer scientists are often convergers.

METHODS

Study data was collected during the fall semester of 1994. All third-year students enrolled in a six-year Doctor of Pharmacy program were eligible to participate. The LSI was administered to these students at the end of a class period. The inventory takes about ten minutes to complete and is designed to be self-administered, with simple instructions and an example. Participation was voluntary. A basic description of the LSI was given. Students were informed that the instrument does not reflect academic performance or ability, but rather preferred modes of study. Questionnaires that were improperly completed were discarded and not included in the analyses.

Nontraditional students, enrolled either in the therapeutics didactic course or in experiential clerkships, were tested by mail because they had no common time on campus to complete the instrument. Participation was voluntary. Students were sent a letter explaining the nature of the LSI as it had been described in the classroom to traditional students. Like the traditional students, LSI administration also occurred at a midpoint in the curriculum. In addition to the instrument, nontraditional students provided blinded demographic information, including gender, age, years since completion of their Bachelor of Science in Pharmacy, and current practice type.

RESULTS

Fifty-six traditional pharmacy students completed the LSI. Nineteen of the traditional students were male. Seventy-six nontraditional pharmacy

students responded to the mailing (mean age: 40 ± 6.7 years). Demographic information of the nontraditional student population is shown in Table 1. The nontraditional group was predominantly male (n = 45). Fifty-six percent of the nontraditional students worked in hospital sites, 28 percent worked in community pharmacies, 4 percent worked in home health/infusion pharmacies, and the remaining 12 percent worked in other settings, such as home health or pharmaceutical sales.

Descriptive statistics for each of the LSI scales are shown in Table 2. There was no significant difference in scores for any of the traits (CE, RO, AC, and AE) between the traditional and nontraditional students, as compared using a Student's t-test ($p > 0.05$). Additionally, combination scores were calculated. These reflect values obtained by subtracting AC − CE (abstract conceptualization minus concrete experience) and AE − RO (active experimentation minus reflective observation). These scores were not significantly different between traditional and nontraditional students when compared using a Student's t-test ($p > 0.05$). Descriptive statistics within subsets of the nontraditional students are shown in Table 3. Similar values with regard to LSI measurements are seen for nontraditional pharmacy students regardless of age, gender, years since graduation, or practice site.

TABLE 1. Demographics of nontraditional students.

Variable	Frequency (%)
Age	
≤ 40	39 (51.3%)
> 40	37 (48.7%)
Gender	
Male	45 (59.2%)
Female	31 (40.8%)
Practice Site	
Community Pharmacy	21 (27.7%)
Hospital Pharmacy	43 (56.6%)
Home Health/Infusion Pharmacy	3 (3.9%)
Other	9 (11.8%)
Years Post-BS Degree	
0-5	5 (6.6%)
6-10	4 (5.3%)
11-20	47 (61.8%)
> 20	20 (26.3%)

TABLE 2. Descriptive statistics for learning style inventory scales.

Variable	Mean	(SD)	Range
Traditional Students			
CE	21.29	(6.5)	13-41
RO	32.29	(6.9)	15-45
AC	33.00	(8.7)	16-48
AE	33.91	(7.8)	18-54
(AE – RO)	1.62	(12.0)	– 21-23
(AC – CE)	11.71	(12.8)	– 19-33
Nontraditional Students			
CE	21.22	(6.5)	12-45
RO	31.42	(6.7)	18-48
AC	33.45	(8.0)	16-48
AE	34.39	(6.4)	19-47
(AE – RO)	2.97	(11.0)	– 26-28
(AC – CE)	12.23	(12.6)	– 29-33

TABLE 3. Descriptive statistics for learning style inventory scales in subsets of nontraditional students.

Variables	Means and (Standard Deviations)											
Gender	**AE**		**AC**		**RO**		**CE**		**AE – RO**		**AC – CE**	
Male	32.9	(5.9)	33.9	(8.0)	32.2	(6.5)	21.5	(6.4)	0.7	(10.2)	12.4	(12.6)
Female	36.5	(6.5)	32.7	(8.0)	30.2	(6.9)	20.9	(6.8)	6.3	(11.5)	11.8	(12.8)
Age												
> 40 years	34.1	(6.3)	34.3	(6.7)	31.1	(7.3)	20.8	(5.4)	3.0	(22.7)	13.5	(9.6)
≤ 40 years	32.7	(9.1)	34.7	(6.4)	31.8	(6.2)	21.7	(7.5)	0.9	(10.4)	13.0	(15.0)
Years Post-BS Degree												
0-5 years	33.0	(7.0)	34.8	(10.4)	34.4	(8.5)	20.0	(5.4)	– 1.4	(9.4)	14.8	(13.9)
6-18 years	37.0	(4.8)	34.3	(10.3)	32.5	(3.9)	15.3	(4.0)	4.5	(9.4)	19.0	(13.4)
11-20 years	34.2	(6.6)	33.0	(8.5)	31.5	(6.5)	21.8	(6.9)	2.7	(11.3)	11.2	(13.6)
> 20 years	34.6	(6.1)	34.0	(6.0)	30.3	(7.5)	21.5	(6.1)	4.3	(11.8)	12.5	(9.9)
Practice Site												
Community	33.2	(6.1)	34.3	(9.1)	32.9	(7.3)	20.5	(7.3)	0.3	(10.0)	13.8	(14.4)
Hospital	35.1	(5.8)	32.5	(7.3)	31.5	(6.4)	21.0	(4.9)	3.6	(10.4)	11.5	(10.2)
Home Health/Infusion	35.0	(14.2)	30.0	(9.0)	30.0	(6.6)	26.3	(15.6)	5.0	(20.7)	3.7	(24.6)
Other	33.4	(7.3)	37.3	(7.7)	27.9	(6.9)	22.4	(8.3)	5.5	(13.3)	14.9	(15.2)

Results of the LSI indicated that traditional and nontraditional students were most commonly assimilators, 50 percent and 43 percent, respectively (Figure 1). Percentages of traditional and nontraditional students for the remaining three learning styles were also similar. Figures 2 and 3 depict each of the traditional and nontraditional students as plotted on the LSI grid. A preponderance of individuals is seen in the assimilator field, with remaining students scattered throughout the other three learning styles.

DISCUSSION

In January 1994, the American Council on Pharmaceutical Education (ACPE) defined a policy that colleges of pharmacy structure nontraditional programs that "assure competencies and outcomes comparable to those expected of the traditional pathway," but at the same time allow for experimentation in "ways and means to deliver content" (3). The need for innovation in teaching methods to reach students in their workplaces and homes demands a rethinking of curricular structure. Inasmuch as restructuring is needed, educators generally accept the need to teach using methods that stress understanding versus memorization and application versus theory. With these thoughts in mind, we compared the learning styles of traditional and nontraditional pharmacy students. All participants were either enrolled in therapeutics or had recently completed the therapeutics coursework.

FIGURE 1. Results of the LSI comparing percent of traditional versus nontraditional students with each of the four corresponding learning styles.

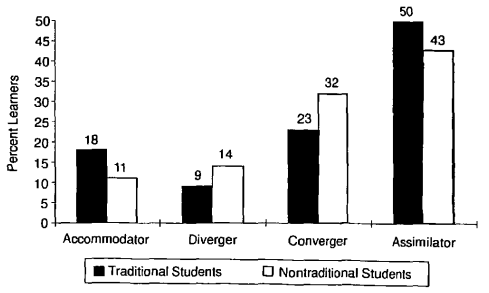
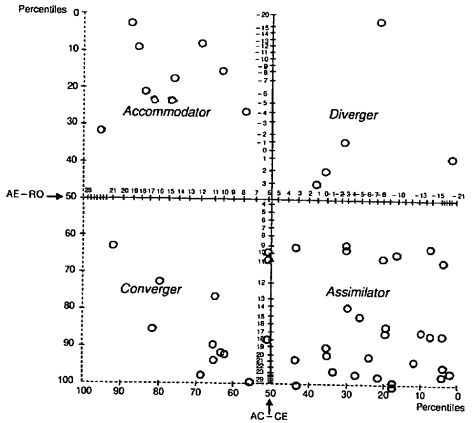


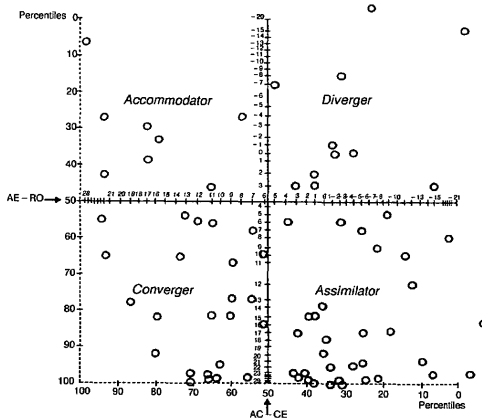
FIGURE 2. Results of the learning styles of traditional pharmacy students as plotted in each quadrant of the LSI grid. (©Experience Based Learning, 1981, revised 1985. Developed by David A. Kolb. Reproduced with permission from McBer & Company, Inc., 116 Huntington Avenue, Boston, MA 02116.)



In 1984, Garvey et al. analyzed the learning styles of 501 traditional pharmacy students and found that the majority of students were convergers (51 percent), as compared to assimilators (20 percent), divergers (12 percent), and accommodators (17 percent) (4). Based on this work, similar results were expected in our traditional students. However, several studies have shown that accounting students manifest an increased preference for abstract thinking and active experimentation the longer they remain in school (5,6). Therefore, we expected that the nontraditional group would differ from traditional students, since they possess richer life experiences and have spent more time in study.

Contrary to this expectation, our results demonstrated similarities in learning styles between traditional and nontraditional students. Moreover, the predominant learning style was that of an assimilator. As suggested by

FIGURE 3. Results of the learning styles of nontraditional pharmacy students as plotted in each quadrant of the LSI grid. (©Experience Based Learning, 1981, revised 1985. Developed by David A. Kolb. Reproduced with permission from McBer & Company, Inc., 116 Huntington Avenue, Boston, MA 02116.)



Kolb's model, all learning is based on a cycle. Learning begins with concrete experience, at which time the learner reflects on what has been seen. At this point, the learner develops some abstract conceptualization of what has been experienced, resulting in active experimentation to judge if what was seen holds true (1). Since all new learning proceeds through these stages, Kolb stressed that learning preferences are likely to emerge and generally remain relatively stable.

The similarities in our traditional and nontraditional students may be attributed to a relatively stable learning environment. However, the differences in learning styles of our students and the learning styles of Garvey's students a decade earlier (4) may be of a different nature. A shift in emphasis from the basic sciences to the clinical sciences has accompanied the continuing evolution of programs from the Bachelor of Science to the

Doctor of Pharmacy. As education changes to reflect new emphases within duties and responsibilities, it is possible that the schools are attracting a different student body. Thus, our differences may be due to changes in the profession and the curricula leading to the degree. Although this may seem to refute the argument that learning styles of our nontraditional students have remained stable over time, we are attracting a subset of former graduates to a nontraditional program which stresses the clinical management of patients. Even a decade earlier, these students may have demonstrated the learning styles of assimilator. Longitudinal studies of Doctor of Pharmacy students will be needed to determine if learning styles evolve or remain constant for our present students.

Students are likely to perform best if they understand the weaknesses of their learning styles and enhance their skills in deficient areas. The Assimilator learning style is characterized by reflective observation and abstract conceptualization. Strengths of this learning style include planning, defining problems, and inductive reasoning. Weaknesses include the inability to make practical applications. Those students meeting the criteria of Assimilator may be able to grasp material, but be unable to apply their knowledge to real-life experiences. Possible mechanisms to strengthen their learning ability include increasing the amount of case-based learning, utilizing standardized patient simulations, and increasing clerkship hours in the curriculum.

Defining the learning style of pharmacy students may be beneficial in designing a nontraditional curriculum which engages students in all four stages of the learning cycle: listening to lectures, thinking about concepts, applying concepts to problems, and comparing what they have learned to reality.

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