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# Learning Styles of Pharmacists: Impact on Career Decisions, Practice Patterns and Teaching Method Preferences

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**This study examined possible associations between learning styles of pharmacists (as identified through Kolb's Learning Styles Inventory (LSI) and the Pharmacists' Inventory of Learning Styles (PILS)) and career decisions, practice patterns and teaching method preferences. A total of 166 pharmacists were involved in this study and completed either the LSI or the PILS, and a supplemental questionnaire. Of them, 33.7% of the respondents were identified as Assimilators, 32.5% as Convergers, 21.1% as Divergers and 12.1% as Accommodators. Results suggest that there is a statistically significant correlation between identified learning style and teaching method preferences as well as years since graduation. While there was no statistically significant correlation between learning styles and gender, career decisions or practice patterns, there does appear to be a trend that warrants further investigation. Implications for delivery of continuing education are discussed, since learning preferences for each group varied considerably.**

*Keywords*: Learning styles; Learning preferences; Pharmacy education; Pharmacy practice

## BACKGROUND

Learning styles have been defined as "...the different ways in which children and adults think and learn" (Litzinger and Osif, 1993). The notion that individuals differ in the way they approach learning situations, problems or challenges is self-evident. Numerous terms have been devised to describe the plethora of strategies and approaches used by individuals: learning by seeing, visual learning, auditory learning and learning by doing are examples of terms that attempt to encapsulate learning styles (Austin, 2002). While each term suggests a certain preference or reliance on a specific strategy, few would suggest that each term is all encompassing. For example, those who may prefer learning by doing, are also capable of learning by reading, and will balance different approaches depending upon a variety of environmental and personal contingencies.

Nonetheless, the notion of individual learning styles or preferences has become widely accepted in education (Norman and Schmidt, 1992), psychology and human resources planning (Quenk, 2000). Numerous theories have been put forth to account for the existence of different, individual specific learning styles, ranging from social structures to personality traits to power dynamics. While the specific reasons for different learning preferences may be controversial, most individuals agree that, as individuals, we learn and approach learning situations in highly variable ways (Blagg, 1985; Felder, 1993; Keane, 1993).

In the literature, significant attention has been paid to the notion of learning styles as they apply to educational settings (Kolb, 1981; Felder and Silverman, 1998; Janing, 2001). Within the context of professional education, Felder and Silverman (1998) have written considerably on technical disciplines such as engineering. Their work suggests that students take in and process information using a variety of strategies. These strategies are best understood as continua, with anchors that act as exemplars rather than exact descriptions of any individual's learning style. They cite specific continua such as seeing and hearing, reflecting and acting, reasoning logically and intuitively, and analyzing and visualizing as broad descriptions

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of individual preferences. In their theory, each individual demonstrates a certain learning preference as a point along the continuum represented by each pair of terms. Such learning preferences will evolve with time within an educational setting and in response to curriculum and other interventions; however, with maturing and development, individuals will demonstrate more fixed preferences for specific modes of information intake and processing.

Gardner (1999) has approached the issue of learning styles from a more behavioral perspective, identifying the choices individuals (both children and adults) make whilst participating in learning situations and interpersonal relationships. His "Multiple Intelligences" approach suggests there are seven primary ways in which environment and individual learning may interact.

- Verbally (through words)
- Logically (through propositions, questions, or mathematics)
- Visual-Spatially (through images, pictures, abstract representations)
- Aurally (through music and rhythm)
- Kinesthetically (through movement or physical activity)
- Interpersonally (through social interaction)
- Intrapersonally (through independence or self-interaction)

The Multiple Intelligences approach suggests that individuals, over time, demonstrate a reliance on one or more of the modes of inquiry described above. For example, a kinesthetic learner prefers learning situations that rely upon movement and activity (such as laboratory based education), while an interpersonal learner prefers learning situations that tend more towards social interaction (such as problem-based learning tutorials). Despite these personal preferences, individuals must, can, and do learn to learn in any and all of these modes.

Kolb's (1981; 1984; 1999) theory of learning styles posits two major axes (or dimensions) upon which learning preferences are constructed. One axis is built upon anchors related to performance ("Doing" vs. "Reflecting") and relates to the ways in which individuals prefer to receive or take in information. The second axis is built upon anchors related to ways in which individuals prefer to process information once it has been received: "Experiencing" vs. "Thinking"). The intersection of these two axes produces four quadrants, each corresponding to a distinct learning preference.

- *Concrete Experience*: being directly, actively, involved in a learning situation.
- *Reflective Observation*: watching others, or developing observations based on one's own experience, in a learning situation.
- *Abstract Conceptualization*: creating theories to explain and understand observations.
- *Active Experimentation*: using (or applying) theories to solve problems and make decisions.

According to Kolb's theory, individuals tend to express preferences along these domains. For example, individuals who have preferences for both concrete experience and reflective observation will demonstrate learning attributes that differ from those who prefer active experimentation and abstract conceptualization. Kolb's theory distills these notions into four major "learning style types".

- *Diverging*: Combining elements of concrete experience and reflective observation, Divergers tend to view situations from multiple perspectives. Their bias is towards observation, rather than action. They tend to enjoy brainstorming and idea generation, and value harmony, listening with an open mind and giving and receiving personal feedback.
- *Assimilating*: Combining elements of reflective observation and abstract conceptualization, Assimilators tend to focus less on individual needs and more on ideas, concepts and logical arguments. Assimilators tend to enjoy analytical work and having time to think things through rather than be put on the spot.
- *Converging*: Combining elements of abstract conceptualization and active experimentation, Convergers demonstrate a preference for practical uses for ideas. They work well in time-pressured situations where problems must be solved and decisions must be made. Convergers tend to prefer to lead, rather than follow, and may prefer dealing with technical tasks and problems rather than social or interpersonal issues.
- *Accommodating*: Combining the elements of active experimentation and concrete experience, Accommodators learn best from hands on experience. They make decisions quickly and decisively, value time efficiency and completing tasks expediently.

The four learning styles identified by Kolb are not intended to be definitive nor diagnostic. Kolb makes the point that individuals, in their daily life, flex their way through all learning styles depending upon circumstances and environment. Learning styles are not "pigeon holes" into which individuals fall, nor are they stereotypes to which individuals rigidly conform. Instead, individuals with a specific learning style generally share certain commonalities with respect to approaches to learning, and this may be

a useful way of initiating discussion and promoting self-reflection upon teaching and learning.

Within the learning styles literature, various trends have been noted. For example, human resources professionals and career counselors may utilize learning styles theory as a way of assisting with vocational counseling (Quenk, 2000). There is some literature, and anecdotal information, suggesting that individuals with certain learning preferences may express specific career patterns aligned to the characteristics of that learning preference (Kolb, 1999; Quenk, 2000). For example, general characteristics of Divergers include dealing creatively with ambiguity, being sensitive to others' needs and feelings, and valuing creativity and self-expression. It has been noted that there may be a preponderance of Divergers in fields such as social work, psychology, nursing, literature, design and theatre/film. Conversely, general characteristics of Assimilators include strong organizational skills, and the ability to analyze quantitative data. It has been suggested that there may be a preponderance of Assimilators in fields such as scientific research, biology, accounting and information sciences. General characteristics of Convergers include willingness and ability to make rapid decisions in ambiguous situations, and leadership. Anecdotal information suggests that certain medical subspecialties (such as emergency medicine and surgery) tend to attract Convergers. Finally, Accommodators often demonstrate skills in time and resource management, and dealing directly with people and situations. Anecdotal information suggests that, within the health professions, there may be a preponderance of Accommodators among technologists (such as radiation or respiratory technicians).

Conspicuous by its absence, there is little mention of pharmacists within the vocational learning styles literature. As an occupational group, pharmacists have numerous career options, ranging from careers in community or hospital pharmacy, or in government, academia, consulting, research or pharmaceutical industry. Expectations and rewards within each career stream vary considerably, and it is intriguing to speculate upon the potential connection between an individual's learning styles and his/her preference for a certain career track within pharmacy practice. Conversely, it may be possible to use learning styles to identify potential misalignments between individuals and their career choices. For example, an individual with strongly Divergent tendencies would not be expected to thrive within a highly structured, technical environment, while an individual with strongly Assimilative tendencies may have difficulty working in an environment that required on the spot problem solving and decision making. While such individuals may be expected to learn to function competently within such environments, learning styles proponents would argue a fundamental misfit between individual preferences and working environment would more likely breed discontent and disengagement.

Within pharmacy education, there have been reports outlining use of learning styles to guide curriculum and planning (Adamcik *et al.*, 1996). Pungente *et al.* (2002) utilized Kolb's Learning Styles Inventory (LSI) to identify first year students' preferences. Their study reported a relatively even distribution of preferences amongst survey responders ($n = 120$), with approximately 36% of first year students being categorized as Accommodators, 20% as Assimilators, 22% as Convergers and 22% as Divergers. The authors used these results to assess preferences towards different activities associated with problem-based learning, and noted that assimilators and accommodators demonstrated somewhat higher preferences for PBL type activities (such as independent learning, expression of understanding through group discussions, etc.) than did their peers who were categorized as Divergers or Convergers. The authors concluded that learning preferences may influence retention and application of knowledge, and that this may in turn be correlated to academic success as measured by grades.

While studies such as that of Pungente *et al.* have been undertaken in undergraduate educational settings, little formal research has been undertaken in the context of occupational choices and continuing professional development (CPD). As practitioners, pharmacists are required to maintain currency in their field, and have numerous options for continuing education. Popular options include lectures by experts, personal reading and review of journals or texts, or small group discussion circles such as journal clubs. Such continuing education programming has become standard in most areas, yet the alignment between these teaching methodologies and pharmacists' learning styles has not been adequately evaluated. Lack of alignment may (as in the case of career decisions) breed disengagement from continuing education with a concomitant effect on competency. Consequently, there is interest in understanding learning styles, learning preferences and career development within the profession of pharmacy within the context of continuous professional development and career choices.

## OBJECTIVE

The purpose of this study was to determine the relationship between pharmacists' learning styles, their occupational choices and continuous professional development preferences.

## METHODS

Participants, in this study, were two cohorts of Canadian pharmacists attending training workshops related to learning styles of undergraduate pharmacy students. Cohort 1 ($n = 115$) were predominantly involved in community or hospital pharmacy practice. Cohort 2 ($n = 61$) were a mixed group representing hospital and community pharmacists, pharmacists working in the pharmaceutical industry and managers/administrators. All participants were individuals who had self selected to attend a workshop on learning styles of students, generally because they were involved in undergraduate or post-graduate clinical education of students, or because of personal interest in the topic.

As part of the workshop, each participant had the opportunity to complete a LSI. Cohort 1 completed a modified version of the Pharmacists' Inventory of Learning Styles (PILS) (Austin, 2003), a learning inventory tool based on Kolb's LSI (see Appendix 1). The PILS has been developed and validated in the context of pharmacy practice, and produces results aligned with those from Kolb's LSI. Cohort 2 completed Kolb's LSI tool. In addition to the completion of the learning inventory tool, participants were asked to report on the following questions.

- Years in practice ($<10, 10-14, 15-19, 20-25, >25$).
- Predominant site of practice (community pharmacy, teaching hospital, community hospital, pharmaceutical industry or others (including academia, licensing/regulatory affairs, consulting, etc.)).
- Predominant role in practice (patient care/clinical pharmacy services, medical information/research, management/administration, dispensing/supervision of dispensing or others (including teaching)).
- Most preferred and least preferred form of teaching/learning (lectures by experts, small group discussion, reading (textbooks/journals), patient simulations/role plays, laboratory based activities, one to one teaching).

In addition, participants were asked to specify their gender (male or female). To ensure face validity of results, participants were also asked to respond to the question "I believe my identified learning style was an accurate reflection of my true learning preferences" on a 4-point Likert scale.

## RESULTS

A total of 176 pharmacists participated in the workshops; all completed the LSI exercise (either the PILS or the LSI, see appendix 1). One hundred and seventy five participants completed and submitted the post-workshop questionnaire. Of these, 166 (94.9%) "strongly agreed" or "agreed" with the statement regarding accuracy of identified learning style. The remaining 9 "disagreed" or "strongly disagreed"; given the discrepancy between self-identification as a learner and results of learning styles testing, these participants' results were not included in any subsequent data analysis.

Of the 166 responses that were analyzed, 113 (68.1%) were from female pharmacists and 53 (31.9%) were from male pharmacists. Of these respondents, 56 (33.8%) were categorized as Assimilators, 54 (32.7%) were categorized as Convergers, 35 (21.2%) were categorized as Divergers and the remaining 21 (12.1%) were Accommodators (all percentage figures subject to rounding).

Participants in this study represented all ages: 30 (18.1%) had been in practice less than 10 years, 32 (19.3%) had practiced for 10–14 years, 55 (33.1%) had practiced for 15–19 years, 41 (24.7%) for 20–25 years and the remaining 8 (4.8%) had practiced for 25 or more years.

Most participants (70 or 42.2%) reported community pharmacy as their primary site of practice, followed by 31 (18.7%) in hospital pharmacy (tertiary care or teaching), 24 (14.4%) in the pharmaceutical industry, 19 (11.4%) from community hospital pharmacy and the remaining 12 (7.2%) from other areas (such as teaching, licensing and regulatory affairs, etc.).

Most participants (55 or 33.1%) cited patient care or patient counseling as their primary role in practice. Forty-five (27.1%) cited dispensing or supervision of dispensing as their primary role, and 36 (21.7%) selected administration or management activities as their primary function. Seven (4.2%) cited medical information or research as their primary role in practice with the remaining 23 (13.9%) selecting "Other" as their primary role (including consulting, teaching, not currently practicing, etc.).

Amongst all participants, teaching modality preferences varied considerably. One to one coaching or teaching (as, for example, in a clinical rotation) was the most favored method (42 or 25.3%), followed by small group discussions (32 or 19.3%), reading journals or textbooks (31 or 18.7%), lectures by experts (27 or 16.3%), laboratory based activities (19 or 11.4%) and role playing/clinical simulations (15 or 9.0%).

Least preferred teaching modalities showed similar variability. Reading journals or textbooks was the most frequently cited unappealing method (57 or 34.3%), followed by role playing/clinical

TABLE I Years in practice as a pharmacist

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| 0–9 years | 11 | 4 | 10 | 5 | 30 |
| 10–14 years | 10 | 2 | 11 | 9 | 32 |
| 15–19 years | 12 | 11 | 22 | 10 | 55 |
| 20–24 years | 18 | 4 | 11 | 8 | 41 |
| >25 years | 5 | 0 | 0 | 3 | 8 |
| Total | 56 | 21 | 54 | 35 | 166 |

TABLE II Predominant (current) site of practice as a pharmacist

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| Community pharmacy | 32 | 7 | 19 | 12 | 70 |
| Teaching hospital | 10 | 5 | 10 | 6 | 31 |
| Community hospital | 9 | 5 | 10 | 5 | 29 |
| Pharmaceutical industry | 5 | 4 | 11 | 4 | 24 |
| Others | 0 | 0 | 4 | 8 | 12 |
| Total | 56 | 21 | 54 | 35 | 166 |

TABLE III Predominant (current) role in practice as a pharmacist

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| Dispensing/supervision | 26 | 8 | 10 | 1 | 45 |
| Patient care/counseling | 19 | 4 | 16 | 16 | 55 |
| Management Administration | 6 | 5 | 18 | 7 | 36 |
| Medical information/research | 3 | 0 | 3 | 1 | 7 |
| Others | 2 | 4 | 7 | 10 | 23 |
| Total | 56 | 21 | 54 | 35 | 166 |

TABLE IV Most preferred teaching modality

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| Expert lecturers | 25 | 0 | 2 | 0 | 27 |
| Laboratory exercises | 0 | 11 | 8 | 0 | 19 |
| One to one teaching | 3 | 6 | 20 | 13 | 42 |
| Reading texts or journals | 28 | 1 | 0 | 2 | 31 |
| Role playing | 0 | 1 | 7 | 7 | 15 |
| Small group discussions | 0 | 2 | 17 | 13 | 32 |
| Total | 56 | 21 | 54 | 35 | 166 |

TABLE V Least preferred teaching modality

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| Expert lecturers | 0 | 6 | 22 | 10 | 38 |
| Laboratory exercises | 13 | 0 | 3 | 3 | 19 |
| One to one teaching | 0 | 0 | 0 | 0 | 0 |
| Reading texts or journals | 1 | 10 | 28 | 18 | 57 |
| Role playing | 32 | 1 | 1 | 4 | 38 |
| Small group discussions | 10 | 4 | 0 | 0 | 14 |
| Total | 56 | 21 | 54 | 35 | 166 |

TABLE VI Distribution of learning preferences by gender

| | Assimilator | Accommodator | Converger | Diverger | Total |
|---|---|---|---|---|---|
| Female | 31 | 18 | 42 | 22 | 113 |
| Male | 25 | 3 | 12 | 13 | 53 |
| Total | 56 | 21 | 54 | 35 | 166 |

simulations and lectures (both at 38 or 22.9%), laboratory based exercises (19 or 11.4%) and small group discussions (14 or 8.4%). No respondents selected one to one teaching as a least preferred teaching modality.

The Kruskal–Wallis test analysis of variance was performed upon data sorted by learning preference (presented in Tables I–VI), in order to determine possible associations between learning style (as identified through the PILS or the Kolb LSI) and career decisions, practice patterns or continuous professional development preferences. It is important to note that group sizes varied considerably, ranging from 21 in the Accommodator subset to 56 in the Assimilator subset. The Kruskal–Wallis test statistic (for 166 participants across 4 groups) was 43.3223 for least preferred teaching modality, 30.0112 for most preferred teaching modality, and 11.1288 for years in practice, with $p < 0.05$ for all three. For gender, site of practice and role in practice, Kruskal–Wallis test statistics did not reach significance at the $p = 0.05$ level.

## DISCUSSION

This survey of practicing pharmacists' learning styles, educational preferences and career choices was undertaken to determine whether any associations existed between these factors. Anecdotally, it has been suggested that learning styles do influence a variety of different decisions over the life course; however, this study suggests this influence may not be as significant as previously described.

Analysis of variance testing using the Kruskal–Wallis statistic determined statistically significant associations between learning style and most preferred/least preferred teaching methods only, with a smaller (though still statistically significant) association with years since graduation. This statistic must be interpreted with caution given the large differences in group sizes, and the uneven distribution of categorical responses within each group. However, findings related to most preferred/least preferred teaching methods are not particularly remarkable given that the explicit reason for using learning styles inventories like the Kolb LSI or the PILS is to identify teaching modality preferences.

The finding regarding an association between years since graduation and learning preference is intriguing insofar as it may confirm the impact of recent changes in admissions policies and procedures to pharmacy programs. In many parts of the world, there has been a concerted effort to diversify the student population and ensure a more heterogeneous pool of undergraduate pharmacy students. Non-academic selection processes (such as interviews) and other criteria such as performance on written tests of critical thinking, have been advocated as important measures in ensuring that pharmacists possess interpersonal competencies necessary for patient care. Where former admissions procedures may have placed emphasis strongly, or almost entirely, upon academic performance (as measured through grades or grade point averages), many schools of pharmacy in different parts of the world currently attempt to balance this with other criteria unrelated to such performance. In identifying a small but statistically significant difference between groups based on years since graduation, this study has confirmed findings previous that broadening admission criteria results may have success in generating more heterogeneous (from a learning styles perspective) pharmacy classes (Pungente *et al.*, 2002).

The differences noted in learning preferences were statistically significant (and in some cases) quite substantial. For example, the Assimilators favored mode of learning was lectures by experts—44.6% of Assimilators rated this as their preferred learning method, in contrast to only 3.7% of Convergers, and 0% of Accommodators and Divergers. Conversely, 40.7% of Convergers rated lectures by experts as their least preferred mode of learning (compared with 28.6% of both Divergers and Accommodators). Strikingly, no Assimilators rated lectures by experts as their least preferred mode of learning. Similarly, bimodal results were noted for preferences regarding learning by reading journals or texts, and to a lesser degree for role-playing/

clinical simulations, and for small group discussions.

For educators, the implications of these findings are significant. At the same time as changes in admissions policies appear to be achieving the goal of creating a more heterogeneous group of pharmacy students and pharmacists, such heterogeneity may introduce tensions in curriculum design, both at the preregistration and practitioner level. While (numerically) most pharmacists in this study were identified as Assimilators, their learning preferences appear distinct and different from those of pharmacists with other learning styles. The marked differences in these preferences suggests educators at all levels in pharmacy face important challenges in structuring educational events that are attractive and meaningful to learners—clearly, a one size fits all approach to education of pharmacists may not be effective for all pharmacists or pharmacy students.

An intriguing finding of this study was the fact that no participant cited one on one teaching and coaching as a "least preferred" teaching method; in fact, a large number of Convergers (37.0%) and Divergers (37.1%) cited one to one teaching as their most preferred method. Such instruction is commonly found in clinical rotations, apprenticeship situations or mentoring relationships and appears to resonate with learners of all types.

In interpreting these results, it is important to note that this study did not attempt to determine the outcome of learning styles. For example, there was no attempt to measure the outcome of a Converger's learning in a lecture setting, or an Assimilator's learning during role-playing/clinical simulations. This study only measured individual's preferences, without making any inferences regarding outcomes. Clearly, as students, individuals are required to learn and perform effectively in a variety of learning environments that may or may not align with their personal preferences. Consequently, despite having specific preferences, most learners successfully adapt to the teaching mode presented, even if it may be sub optimal. Kolb has commented on the need to provide learners an opportunity to develop and grow by exposing them to all learning styles so that (despite their innate preferences) they are able to demonstrate better flexibility and adaptability in a variety of circumstances. While there is definite merit in this approach, it is also important to be mindful of the freedom exerted by busy, adult professionals in selecting continuing education events. In the context of time-pressured decision making, some learners may choose to optimize their learning by attending events that align with their preferences—and avoiding those which do not. While the learning outcomes from each may be similar or not substantially different, the value in recognizing different learners' needs and preferences may provide encouragement and support to facilitate attendance, engagement and learning.

While no statistically significant associations were found between learning preference and site of practice or role in practice, there appear to be trends that may be suggestive. For example, a large number of Assimilators defined their primary role in practice as dispensing or supervising of dispensing (46.4%), compared with only 2.9% of Divergers. Similarly, 33.3% of Convergers identified their primary role in practice as managerial or administrative, compared with 10.7% of Assimilators. With respect to Site of Practice, 22.9% of Divergers stated they were not working in traditional pharmacy practice settings such as community, hospital or industry, compared with 0% of Assimilators and 0% of Accommodators.

Such findings are consistent with the general principles of learning styles and the expected preferences of individuals with these styles. The tendency of Assimilators to adopt traditional roles in traditional practice settings with fairly well defined responsibilities and expectations is in contrast to the Divergers tendency to seek "out of the box" practice settings and roles.

While these findings did not achieve statistical significance, this trend argues for further inquiry and examination. One reason for the lack of statistical significance may be related to the relatively small sample size ($n = 166$) given the number of categories and rankings involved in this study. Alternatively, this trend may simply be an artifact, particularly given the non-representative nature of the sampling in this study. Recall that participants in this study were not randomly selected, nor actively recruited to participate. Participants were invited to participate after they had made the decision to attend a workshop for individuals involved in teaching of pharmacy students. A self-selection bias (i.e. those interested in teaching students and those interested and able to attend the workshop) means the sample for this study is not truly representative of pharmacists in general. This is further reflected in the somewhat skewed demographic of the sample (i.e. an over-representation of hospital pharmacists from teaching/tertiary care settings, an under-representation of pharmacists whose primary role is dispensing/supervising dispensing, and an under-representation of pharmacists in practice 20 years or more).

Nonetheless, the trends identified in the workplace data are suggestive of some possible associations between learning styles and career choices, and merits further investigation.

## CONCLUSIONS

The links between learning styles, career decisions and preferences for CPD have been discussed and debated in the educational literature. This study provides preliminary data to support the notion that, in pharmacists, there is an association between learning styles and preferences for CPD and that there may possibly be some trend supportive of an association between learning styles and career decisions. While the latter did not reach significance in this study (for reasons related to sample size and sample selection), the data are suggestive of a trend that merits further investigation.

For educators, employers and pharmacists, there is clear value in understanding learning styles in order to optimize effectiveness and efficiency of continuous professional development. There are marked and statistically significant differences in the ways in which pharmacists with different learning styles prefer different learning modes. While there is no suggestion that these differences have a substantial effect on learning outcomes, the strength of differences suggests that curriculum planners may be best advised to ensure a variety of educational methods are available to meet a variety of preferences. Reliance on one or two modes of learning (such as expert driven lectures and reading) may appeal to some learners (i.e. Assimilators) but risks disengaging other learners (such as Divergers, Convergers and Accommodators).

This study suggests that the pharmacy workforce may be somewhat imbalanced in having an overrepresentation of Assimilators and Convergers as compared with Divergers and Accommodators. In interpreting these findings, however, it is important to note that the study sample was nonrepresentative, and tended to skew towards those interested in pharmacy education and pharmacy students. Nonetheless, there was a clear preponderance of Assimilators and Convergers, perhaps a reflection of admissions policies in the past that may have favored certain attributes most frequently associated with these learning types. Recognizing the preponderance of Assimilators and Convergers in the profession, it may be interesting to undertake further research on other professions to determine their preponderant learning styles, and to examine interprofessional communication and team work using learning style theories.

While this study did not conclusively demonstrate a link between learning styles and career choices, there does appear to be a suggestive trend that merits further exploration. It is, of course, important to note that studies of this sort do not aim to make causal connections between observed phenomena and learning styles. As Kolb has discussed, learning styles are fluid and flexible, and competent adults learn to adapt to a variety of learning situations no matter what their innate learning preference may be. However, this study has provided unique insights into the learning styles of pharmacists, and provided important information for educators, employers and pharmacists about the ways in which we learn and work as professionals.

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## APPENDIX I: THE PHARMACISTS' INVENTORY OF LEARNING STYLES (PILS)

Think about a few recent situations where you had to learn something new to solve a problem. This could be any kind of situation: while you were taking a course at school, learning to use new software or figuring out how to assemble a barbecue.

Now, circle the letter in the column that best characterizes what works best for you in situations like the ones you have thought about.

Now, add up the number of times you circled each letter:

| When I am trying to learn something new… | Usually | Sometimes | Rarely | Hardly |
|---|---|---|---|---|
| 1. I like to watch others before trying it for myself. | B | D | C | A |
| 2. I like to consult a manual, textbook, or instruction guide first. | B | C | D | A |
| 3. I like to work by myself, rather than with other people. | A | C | B | D |
| 4. I like to take notes, or write things down as I am going along. | B | C | D | A |
| 5. I am critical of myself if things do not work out as I hoped. | B | C | D | A |
| 6. I usually compare myself to other people just so I know I am keeping up. | B | D | C | A |
| 7. I like to examine things closely instead of jumping right in. | B | D | C | A |
| 8. I rise to the occasion if I am under pressure. | C | A | B | D |
| 9. I like to have plenty of time to think about something new before trying it. | D | B | C | A |
| 10. I pay a lot of attention to the details. | B | C | A | D |
| 11. I concentrate on improving the things I did wrong in the past. | C | A | D | B |
| 12. I focus on reinforcing the things I got right in the past. | B | D | A | C |
| 13. I like to please the person teaching me. | D | B | A | C |
| 14. I trust my hunches. | D | C | A | B |
| 15. In a group, I am usually the first one to finish whatever we are doing. | A | C | D | B |
| 16. I like to take charge of a situation. | C | A | B | D |
| 17. I am well-organized. | B | A | C | D |

**A =** **B =** **C =** **D =**

Your **DOMINANT** learning style is the letter you circled most frequently.

Your **SECONDARY** learning style is the next most-frequently circled letter.

### A = Accommodator

You enjoy dealing directly with people, and have little time or patience for indirect or soft-sell jobs. You enjoy looking for, and exploiting, opportunities as they arrive, and have an entrepreneurial spirit. You learn best in a hands-on, unencumbered manner, not in a traditional lecture style format. Though you do not take any particular pleasure in leading others, you do so because you sense you are best suited for the job. You are confident, have strong opinions, and value efficiency. You are concerned about time, and like to see a job get done. Sometimes, however, your concern with efficiency means the quality of your work may suffer, and that you may not be paying as much attention to others' feelings and desires as you ought to.

### B = Assimilator

You generally prefer working by yourself, at your own pace, and in your own time, or with a very small group of like-minded people. You tend to avoid situations where you are the center of attention, or you are constantly being watched—you prefer to be the one observing (and learning) from others. You have an ability to learn from your own—and other peoples'—mistakes. You place a high priority on getting things done properly, according to the rules, but at times, you can be your own worst critic. You value organization, and attentiveness to detail.

### C = Converger

You are focused, practical and to the point. You usually find yourself in a leadership role, and enjoy this challenge. You have little time or patience for those who dither or are indecisive, or who spend too much time on impractical, theoretical matters. You are good at coming to quick, decisive conclusions, but recognize that at times your speed may result in less than perfect results. You would rather get a good job done on time, than get an excellent job delivered late. You like being in a high-performance, high-energy, fast-paced environment.

### D = Diverger

You enjoy out-of-the-box environments where time and resources are not particularly constrained. You have a flair for keeping others entertained and engaged, and sincerely believe this is the way to motivate others and get the best out of everyone. You are most concerned—sometimes too concerned—about how others perceive you, and you place a high priority on harmony. You find little

difficulty dealing with complex, ambiguous, theoretical situations (provided there is not a lot of pressure to perform), but sometimes have a hard time dealing with the practical, day-to-day issues.

Now, as a group of individuals with the same dominant learning style, think about the following questions and share your opinions:

(1) What professional, social or personal characteristics do you have in common?
(2) What teaching and learning methods work best for you?
(3) What teaching and learning methods do not work well for you?
(4) Give some examples of the type of feedback that motivates you.
(5) Give some examples of the type of feedback that discourages you.

Now, share your group's discussion with members of the other learning styles' groups