

Student and Faculty Learning Styles in a Canadian and a Chilean Self-Directed, Problem-Based Nursing Program

**Barbara Carpio, Monica Illesca, Patricia Ellis,
Dauna Crooks, Jacqueline Droghetti,
Catherine Tompkins, and Charlotte Noesgaard**

Une étude descriptive comparative a été menée afin d'identifier et de comparer les styles d'apprentissage chez les enseignants et les étudiants de premier cycle œuvrant dans le cadre de 2 programmes en sciences infirmières autogérés (AAG) et axés sur des problèmes (AAP). Dans un programme en sciences infirmières d'une université canadienne, le Kolb LSI-1985 a été appliqué auprès de 94 étudiants génériques de premier cycle, 63 étudiants à l'étape post-i.a. et 22 membres du corps enseignants. Une traduction espagnole a été réalisée par 37 étudiants en sciences infirmières, premier cycle, et 13 enseignants d'une université chilienne. Une analyse de variance des notes moyennes de groupes révélait d'importants écarts parmi les 4 groupes d'étudiants utilisant un mode d'apprentissage axé sur l'expérience active. Des tests ultérieurs ont confirmé que les étudiants chiliens sont moins portés sur l'apprentissage actif que leurs enseignants ou les étudiants canadiens. Ceci constitue une importante découverte en ce qui a trait à la préparation des étudiants à prendre en main leur propre apprentissage. Comparativement aux enseignants chiliens, les enseignants canadiens ont récoltés des scores supérieurs sur le point de la conceptualisation abstraite, ce qui génère des implications concernant le développement, chez le enseignants, de compétences d'éducateurs AAG / AAP.

A descriptive comparative study was conducted to identify and compare/contrast the learning styles of nursing faculty and entry-level students in 2 self-directed (SDL), problem-based (PBL) nursing programs. The Kolb LSI-1985 was administered to 94 first-year generic students, 63 post-R.N. students, and 22 faculty members in a Canadian university nursing program. A Spanish translation was completed by 37 incoming nursing

Barbara Carpio, R.N., M.Sc.N., M.Sc.(T), is Assistant Professor, School of Nursing, McMaster University, Hamilton, Ontario. Monica Illesca, E.U., is Assistant Professor, Nursing Program, Universidad de la Frontera, Temuco, Chile. Patricia Ellis, R.N., M.Sc.N., is Associate Professor, School of Nursing, McMaster University. Dauna Crooks, R.N., D.N.S., is Assistant Professor, School of Nursing, McMaster University. Jacqueline Droghetti, E.U., is Assistant Professor, Nursing Program, Universidad de la Frontera. Catherine Tompkins, R.N., Ph.D., is Associate Professor, School of Nursing, McMaster University. Charlotte Noesgaard, R.N., M.Sc.N., is Assistant Professor, School of Nursing, McMaster University.

students and 13 faculty members in a Chilean university. One-way ANOVA analysis of group mean scores showed significant differences among the 4 student groups in the active experimentation learning mode. Post hoc tests confirmed that Chilean students are less likely to be active learners than their teachers or Canadian students, a finding of significance in preparing students to assume self-direction of their learning. Canadian faculty had higher abstract conceptualization scores than Chilean faculty, which has implications for faculty development of educator roles for SDL/PBL.

Introduction

A global challenge for nursing education is to prepare nurses to assume greater autonomy in decision-making and leadership in health care. Nurses need to understand not only their personal learning styles, but also those of their clients in order to provide client-centred care. Proponents of theory-based and evidence-based practice believe that more thoughtful, competent care will be the outcome of a more theoretical approach to nursing education (Meleis & Price, 1988). Changes in the education of future nurses should likewise be based on sound evidence and strategies, and the complexity of educational change must be addressed (Fullan, 1982).

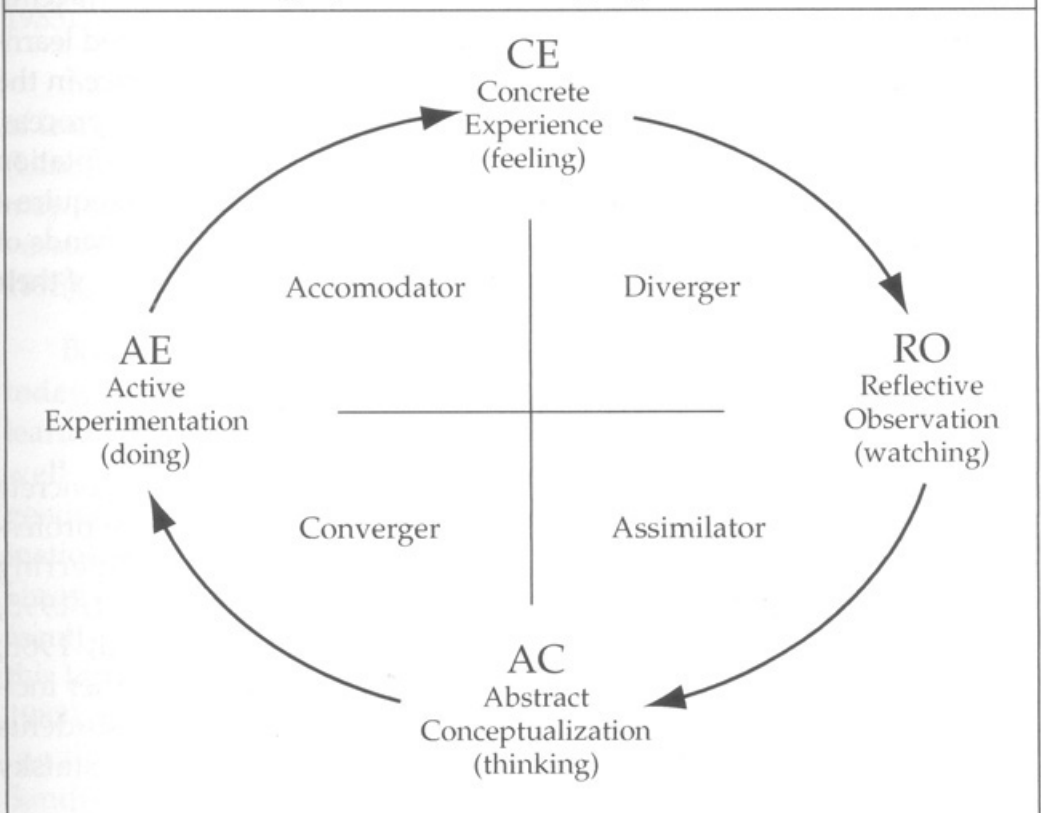
The McMaster University School of Nursing has worked with the nursing program at the Universidad de la Frontera (UFRO) in Temuco, Chile, to support curriculum reform in a learner-centred, self-directed (SDL), small-group and problem-based (PBL) approach to the education of health professionals. Adapting the small-group SDL/PBL approach in international settings has brought about renewed discussion on the readiness of nursing students to assume self-direction in learning. This paper will discuss differences and similarities in learning styles in Canadian and Chilean nursing students and faculty, and the implications for SDL.

Theoretical Framework

Kolb's (1984) Experiential Learning Theory is based on a "holistic framework for viewing adult development in learning in which critical linkages of education, work and personal development are emphasized. Learning is viewed as life-long process of adaptation in which affective experience plays a central role" (Holbert & Thomas, 1988, p. 31). Information is transformed through four learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Figure 1). The Learning Styles Inventory (LSI-1985) (Kolb, 1985) classifies learning preferences as active or reflective and as concrete or abstract. Learners are classified as accommodators, diverg-

ers, convergers, or assimilators based on self-reported competencies (scores) in the four learning modes (Figure 1). Preferred Learning Cycles reflect the order in which learners process information through the four learning modes.

Figure 1 *Learning Cycle and Learning Styles (Kolb, 1984)*



Student-centred SDL is an androgogical approach in which learners take an active role in planning, implementing, and evaluating their own learning and that of their peers (Barrows, 1985; Barrows & Tamblyn, 1980; Knowles, 1975, 1986). Self-assessment of personal learning styles is an initial step in helping students to recognize their own strengths and needs in order to develop a personal learning plan (Tompkins & McGraw, 1988) and to identify and use a variety of learning resources and strategies complimentary to their personal style (College of Nurses of Ontario, 1996). They may select learning strategies with which they are comfortable, or they may challenge themselves with strategies different from their usual style. In a small-group learning format, learners will usually have different preferred learning styles. This dissonance in approach to learning may cause frustration until students come to understand that each person learns differently.

Once learning styles are identified, students come to recognize the value of other approaches to learning. Identifying their own and their students' preferred learning styles also helps educators to become aware of when their preferred teaching style is not understood (Hunt, 1987).

While no inherent hierarchical value is assigned to any style, Kolb (1984) has suggested that individuals are attracted to a profession whose learning environments are compatible with their preferred learning style, and that these styles are accentuated with experience in the profession. He further asserts that learning is a developmental process, and that in order to function effectively and facilitate career adaptation in complex and changing professional environments, learners require a balance of learning styles. To keep pace with the changing demands of the profession, practitioners need to be life-long learners, aware of their own learning styles and preferences (Callin, 1996; CNO, 1996).

Literature Review

Some studies report nursing students to have predominantly concrete learning styles, consistent with assertions that human-service professionals have concrete, people-oriented learning styles, preferring "doing" to "theorizing" (Cavanagh, Hogan, & Ramgopal, 1995; Laschinger, 1990, 1992; Laschinger & Boss, 1989; O'Kell, 1988; Thompson & Crutchlow, 1993). Others, however, report a higher incidence of abstract styles, particularly among baccalaureate students (Joyce-Nagata, 1996; Ridley, Laschinger, & Goldenburg, 1995; Stutsky & Laschinger, 1995).

While Kolb (1984) suggests there is a developmental component to learning styles, nursing studies have reported inconsistent findings. Stability of learning styles over the course of nursing education programs has been reported for both baccalaureate (Wells & Higgs, 1990) and diploma students (Rakoczy & Money, 1995). Jambunathan (1995) found that reflective assimilator junior students became more active accommodators as they progressed through their program. This contrasts with Highfield's (1988) earlier finding that the assimilator style persisted into senior years of study. Daly (1996) found that nurse managers moved from concrete-divergent mode towards abstract-convergent mode with increased education, a finding that may be relevant for post-diploma programs.

Attempts have been made to identify the characteristics of students likely to have difficulty in their nursing studies. Remington and Kroll

(1990) report a predominance of concrete, particularly diverger, styles among students identified as "high risk." Haislett, Hughes, Atkinson, and Williams (1993) found that academically successful baccalaureate students were most likely to be assimilators and divergers, with accommodators being most at risk for academic difficulty. Other researchers have not found a significant relationship between learning style and academic performance (Cranston & McCort, 1985; DeCoux, 1990; Merritt, 1983).

Students in baccalaureate programs may exhibit more of a balance of learning styles than their counterparts in diploma nursing programs (Laschinger & Boss, 1989), and recent studies suggest that the LSI-1985 may classify more nursing students as abstract learners than an earlier version of the instrument (Ridley et al., 1995; Stutsky & Laschinger, 1995).

Because of the complexity and rate of change in work environments today, nursing students should be encouraged to explore a variety of learning approaches (Jambunathan, 1995; Rakoczy & Money, 1995). As well, the increasing diversity of nursing students in terms of age, gender, and prior nursing and learning experiences calls for a re-examination of learner needs (Cavanagh et al., 1995; Cowman, 1995; Griggs, Griggs, Dunn, & Ingham, 1994). It is therefore important for nursing faculty to be aware of their own styles and those of their students, as this influences their selection of teaching strategies (Laschinger & Boss, 1983). Nurse educators may place greater emphasis on abstract learning than general nursing populations (Duff, Laschinger, Arguello, Sandino, & Samora, 1995; Laschinger, 1986; Marcinek, 1983). International studies suggest that differences in preferred nurse teacher learning styles and practices may reflect cultural differences (Duff et al., 1995; Duff, Johnston, & Laschinger, 1992; Wubbels & Levy, 1991).

In summary, many studies with nursing students and faculty show that concrete learning styles are preferred by nurses, although there may now be a trend towards greater preference for abstract learning styles either due to measurement (LSI-1985) or as a reflection of the complex nature of nursing environments and practice.

Self-directed, small-group learning is new to many students and may be inconsistent with their learning experiences or preferred learning styles. However, there has been limited study of student readiness for SDL (Crook, 1985). Some researchers even report a decline in orientation towards SDL and collaborative learning as students progress through their studies (Montecinos, Illesca, & Yanez, 1993; O'Kell, 1988).

No international comparative studies of learning styles in SDL nursing programs were found in the literature. The present study was designed to address this gap in the literature and to strengthen understanding of SDL in nursing.

Purpose of Study

The purpose of this study was to identify and compare/contrast the learning styles of nursing faculty and students entering a Canadian and a Chilean university nursing program, based on small-group and SDL methodology.

Research Hypotheses

A number of questions arose regarding the relationships between learning styles and students and faculty in SDL/PBL curricula, which led to the following hypotheses:

1. Students selecting an SDL/PBL university nursing program will prefer reflective and abstract learning styles.
2. Post-diploma R.N. students will prefer active experimentation more than generic students.
3. Faculty will emphasize reflective observation and abstract conceptualization to a greater degree than their students.
4. Preferred learning styles of Canadian students and faculty will differ from those of their Chilean counterparts.

Design

A descriptive comparative survey was undertaken to determine learning styles of nursing faculty and incoming students in a Canadian and a Chilean university nursing program. Students in the Canadian B.Sc.N. program enter the program from one of three applicant pools: those applying to the 4-year generic program directly from high school (OAC), those with other qualifications (non-OAC), and registered nurses applying to the 2-year post-diploma program (post-R.N.). While the OAC applicants are offered admission to the program based solely on grades, the non-OAC and post-R.N. applicants participate in a selection process designed to address readiness to undertake self-directed study in a small-group, problem-based curriculum (Brown, Carpio, & Roberts, 1991; Carpio & Brown, 1993). In the first semester of both the generic and post-diploma programs, students are introduced to SDL/PBL in small-group tutorials facilitated by faculty tutors.

At the Universidad de la Frontera, as in all public universities in Chile, applicants are admitted to the nursing program based on grades obtained on the nation-wide pre-university entrance examination. At the time of the study, the first small-group, student-centred component of the nursing curriculum was introduced in the third semester following two semesters of a traditional program of non-nursing course work, common to all health sciences students.

The study to identify the learning styles of incoming students was approved by the review bodies at each site. All incoming students at both universities completed the LSI-1985 as part of their in-class orientation to SDL/PBL in their respective program. At the end of the orientation sessions, students were invited to participate in the study. They were assured of the anonymity of their responses and were asked to complete a short demographic questionnaire and to submit their LSI scores in a sealed envelope to their faculty tutors at the end of class.

The Canadian sample comprised 157 students: 63 post-R.N. students (79% of the class) and 94 students in the first year of the generic program (88% of the OAC students and 75% of the non-OAC students). The student sample was predominantly (91%) female. Sixty-nine first-year students were under 20 years of age and 49 students (most of whom were post-R.N. students) were over 29 years of age. Sixty-one students reported SDL as a new experience. Fifty-five students reported experience with SDL in high school, 20 reported experience with SDL in university, and 21 reported exposure to SDL in community college nursing programs. While 87 reported no experience with PBL, 38 reported experience with PBL in high school, 23 in community college, and 21 in university.

A convenience sample of 22 nursing faculty also completed the LSI. All were women teaching in the first year of the program, and all but one had been a tutor in the program for at least 1 year prior to the study.

The Chilean sample comprised 36 (97%) students enrolled in their first semester of nursing studies and 13 female nurse educators. The student group was predominantly female (86.5%), and the mean age was 21.75 years. None of the Chilean students reported prior experience with SDL or PBL. All the Chilean faculty members had participated in preparatory workshops for orientation to the role of tutor in student-centred SDL/PBL education, though only five had implemented the role prior to the study.

Instrumentation

The Learning Style Inventory (LSI-1985) asks respondents to complete 12 statements about learning by rank ordering sentence endings representative of the four learning modes depicted in experiential learning theory. Scores are generated for each of the learning modes, and the extent to which a learner prefers abstract learning over concrete experience and active versus reflective learning are also calculated. Preferred learning styles are then determined based on these scores. Internal consistency of the instrument has been tested and found to be acceptable (Cronbach's coefficient alpha 0.73–0.88 and split-half reliability Spearman-Brown 0.71–0.85) (Smith & Kolb, 1986), and it continues to be a widely used instrument. Numerous studies have shown learning style preferences of various occupational and student groups consistent with the theoretical expectations, supporting the construct validity of the instrument.

A Spanish version of the LSI-1985 (Duff et al., 1995) was administered in Chile following review of the translation/back translation according to asymmetrical translation methodology (Jones, 1987; Phillips, Luna de Hernandez, & Torres de Ardon, 1994) by bilingual members of the investigator team at both universities.

Data on participants' age, gender, and prior experience with SDL and PBL were collected using a questionnaire designed for the study.

Sample

All students entering the SDL/PBL component of their respective nursing curriculum in 1996 completed the LSI-1985 as part of their in-course orientation. Only those students who consented to participate in the study were included in the sample. A convenience sample of faculty members teaching entry-level courses also completed the LSI-1985. Following data entry for the study, completed inventories were returned to participants for use in developing personal learning plans.

Findings

Group mean scores and standard deviations in the four learning modes plus the combined scores (concrete-abstract and active-reflective) were calculated for the four student and two faculty groups. Inferential analysis of interval data compared the student group mean scores using one-way ANOVA. Post hoc multiple comparisons were then made using the group mean scores of each pairing of the student groups.

T-test comparisons were made between faculty groups and also between students and faculty at each institution. Preferred learning styles of students and faculty at each institution were identified based on individual LSI-1985 scores, and the frequency distributions of the four learning styles were compared using Chi-square.

In this study, reliability coefficients of the English version LSI-1985 subscales ranged from .81 to .83 using Cronbach's coefficient alpha and from .79 to .85 using Guttman split half. The Spanish version subscales ranged from .67 to .79 (Cronbach's coefficient alpha) and from .62 to .73 (Guttman split half).

Student-Group Learning Cycles

Mean group scores illustrate that all four student groups placed the greatest emphasis on active experimentation (AE) or "doing" mode, with the Chilean students scoring lowest and non-OAC the highest (Table 1). Based on group mean scores in the four learning modes, the OAC students preferred a learning cycle of active experimentation-abstract conceptualization-reflective observation-concrete experimentation (AE-AC-RO-CE). The non-OAC, post-diploma, and Chilean students all preferred active experimentation-reflective observation-abstract conceptualization-concrete experience (AE-RO-AC-CE). First-year Canadian students, both OAC and non-OAC, preferred active learning more than Chilean students (one-way ANOVA $F_{3,154} = 3.080$, $p = 0.029$). All groups placed least emphasis on the concrete experience (CE) "feeling" mode. The Chilean student group had the highest mean group score, the OAC group the lowest, though the differences did not reach a level of statistical significance. While the non-OAC, post-R.N., and Chilean students all preferred reflective observation (RO) over abstract conceptualization (AC), the OAC group had the highest AC scores. Post hoc multiple comparisons using Tukey's HSD and LSD confirmed that the Chilean students were less active learners than both the non-OAC and OAC student groups ($F = 3.6065$ $p_{(LSD)} = 0.007$ $p_{(HSD)} = 0.031$; $F = 3.6065$ $p_{(LSD)} = 0.013$ $p_{(HSD)} = 0.060$, respectively).

Turning to the two combined scales that indicate preferences for abstract (AC-CE) and active (AE-RO) learning, the OAC group had the highest mean abstract learning score and the non-OAC group had the highest active learning mean score. The Chilean students had the lowest mean scores on both scales, though none of the inter-group differences reached a level of statistical significance. All four student groups exhibited a more balanced learning style type than those reported for community college nursing students (Rakoczy & Money, 1995).

Table 1 Mean LSI-1985 Scores of Student Groups

Group	<i>n</i>	CE \bar{x} (SD)	RO \bar{x} (SD)	AC \bar{x} (SD)	AE \bar{x} (SD)	AC-CE \bar{x} (SD)	AE-RO \bar{x} (SD)
OAC	73	25.4	29.5 (8.0)	31.1 (8.0)	34.3 (7.7)*	5.7 (14.7)	4.7 (13.1)
Non-OAC	21	25.8	30.0 (7.3)	28.3 (6.4)	36.1 (7.8)*	2.5 (11.6)	6.0 (12.7)
Post-R.N.	63	26.4	30.3 (7.2)	29.7 (7.3)	33.4 (7.0)	3.3 (12.5)	3.3 (11.6)
Chilean	36	29	30.2 (5.1)	30.0 (6.5)	30.8 (4.9)*	1.2 (10.8)	0.7 (8.6)
* $F_{3,154} = 3.080, p = 0.029$							
Post-hoc Comparisons (Tukey's)							
OAC vs. Chilean		$F = 3.6065,$	$P_{(LSD)} = 0.013^*$	$P_{(HSD)} = 0.060^*$			
Non-OAC vs. Chilean		$F = 5.3254,$	$P_{(LSD)} = 0.007^*$	$P_{(HSD)} = 0.031^*$			

Table 2 Learning Style Distribution among Student Groups as Determined by LSI-1985

Learning Style	OAC		Non-OAC		Post-R.N.		UFRO	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Diverger	11	15	6	28.6	13	20.6	14	38.9
Accommodator	20	27.5	6	28.6	17	27	8	22
Converger	20	27.5	6	28.6	15	23.8	4	11.1
Assimilator	22	30	3	14.3	18	28.6	10	27.8
$\text{Chi}^2 = 11.37, df = 9, p = 0.25$								
(continued on next page)								

Table 2 (cont'd)

Learning Style	OAC		Non-OAC		Post-R.N.		UFRO	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Concrete	31	42	12	57	30	48	22	61
Abstract	42	58	9	43	33	52	14	39
$\chi^2 = 3.96, df = 3, p = 0.27$								
Active	40	55	12	57	32	51	12	33
Reflective	33	45	9	43	31	49	24	67
$\chi^2 = 5.11, df = 3, p = 0.16$								

Table 3 Mean LSI-1985 Scores of Faculty Groups

Group	<i>n</i>	CE \bar{x} (SD)	RO \bar{x} (SD)	AC \bar{x} (SD)	AE \bar{x} (SD)	AC-CE \bar{x} (SD)	AE-RO \bar{x} (SD)
Canadian	22	26.4 (6.5)	27.1 (9.8)	34.1 (6.1)*	32.3 (7.5)	7.7 (8.9)**	5.1 (15.0)
Chilean	13	29 (4.4)	27.0 (5.7)	28.5 (5.1)*	35.5 (7.8)	0.5 (8.0)**	8.5 (12.7)
* $t_{33} = 2.83, p = .008$; ** $t_{33} = 2.75, p = .009$							

Individual Student Learning Style Preferences

Based on scores obtained in each of the learning modes, individual learning style preferences were determined and the frequencies of learning style preferences calculated for each group (Table 2). Analysis of distributions among the four student groups showed no statistically significant differences for learning styles, proportion of concrete versus abstract learners, or distribution of reflective and active styles. However, the Chilean students were less likely to be abstract learners than their first-year Canadian counterparts ($Chi^2 = 8.12$, $df = 3$, $p = .04$).

The abstract styles of assimilator and converger were preferred by slightly more than half the OAC and post-R.N. students, a distribution similar to that reported by Ridley et al. (1995) and Stutsky and Laschinger (1995). The assimilator style was preferred by less than one third of each group, in contrast to Highfield's (1988) sample of baccalaureate students, who were predominantly concrete assimilators.

Concrete learning styles were selected by fewer than half the Canadian students in each group. The accommodator style was preferred by nearly one quarter of each student group. The diverger style was the least common style among the OAC and post-R.N. students but was the most frequently preferred style for the Chilean students (38.9%).

Active learning is characteristic of the accommodator and converger styles preferred by slightly more than half the Canadian students and one third of the Chilean students. While no significant between-group differences were found in the overall distribution of active styles, the Canadian students were twice as likely as the Chilean students to be abstract convergers.

Cavanagh et al. (1995) suggest that prior educational experiences shape the perceptions and attitudes of learners. The non-OAC group scores were compared in turn with the OAC students (with whom they shared the experience of having no prior nursing education) and then with the post-R.N. group, who also had prior post-secondary education and "life experience" beyond that of the OAC group. Because the non-OAC and post-R.N. students participate in a rigorous selection process, it was thought they might share characteristics different from the OAC and Chilean students, who are admitted solely on the basis of academic performance. However, the post-R.N. students did not differ from the younger and/or non-nurse students. This contrasts with the findings of Cavanagh et al. and Griggs et al. (1994), though it is consistent with Highfield's (1988) findings with generic and post-R.N. students.

Overall, first-year Canadian students (OAC plus non-OAC) were more likely to be convergers and less likely to be divergers than the Chilean students. However, the small size of the non-OAC sample, plus the lack of statistical differences among the OAC and post-R.N. student groups, prevented any conclusions from being drawn.

Faculty Learning Cycles

Based on group mean scores in the four learning modes (Table 3), the learning cycle preferred by Canadian faculty was abstract conceptualization-active experimentation-reflective observation-concrete experience (AC-AE-RO-CE), while that of the Chilean faculty was active experimentation-concrete experience-abstract conceptualization-reflective observation (AE-CE-AC-RO). T-test comparisons showed that Canadian faculty had significantly higher abstract conceptualization scores ($t_{33} = 2.83, p = .008$) and AC-CE mean group scores ($t_{33} = 2.75, p = .009$) than their Chilean counterparts, indicating a greater emphasis on abstract learning.

Faculty Learning Style Preferences

Frequencies of learning style preference of individual faculty were also calculated (Table 4). The learning style most frequently selected by

Table 4 <i>Learning Style Distribution among Faculty Groups</i>				
	Canadian		Chilean	
Learning Style	<i>n</i>	%	<i>n</i>	%
Diverger	4	18.2	3	23.1
Accommodator	3	13.6	5	38.4
Converger	10	45.5	3	23.1
Assimilator	5	22.7	2	15.4
$Chi^2 = 2.627, df = 3, p = 0.453$				
Concrete	7	31.8	8	61.5
Abstract	15	68.2	5	38.5
$Chi^2 = 2.947, df = 1, p = 0.086$				
Active	13	59.1	8	61.5
Reflective	9	40.9	5	38.5
$Chi^2 = 0.02, df = 1, p = 0.886$				

Canadian faculty (45.5%) was that of abstract converger, while Chilean faculty (38.4%) were concrete accommodators. Fully 61.5% of the Chilean faculty preferred concrete styles, compared to 31.8% of the Canadian sample. While abstract styles accounted for fully 68.2% of the Canadian faculty and only 38.5% of the Chilean faculty, no significant between-group differences were found ($\chi^2 = 2.947, p = .086$).

Active learning styles (accommodator and converger) characterized 59.1% of the Canadian faculty and 61.5% of the Chilean faculty. Reflective learning styles were preferred by 40.9% of Canadian and 38.5% of Chilean faculty. Thus, while the Chilean faculty were twice as likely to be concrete learners than their Canadian counterparts, the groups were similar in their preference for active learning styles.

Comparison of Faculty and Student Learning Styles

A final step in the analysis of data was comparison of learning styles between faculty and student groups at each institution. There was no significant difference between Canadian students and faculty on mean CE, RO, or AE scores; however, the mean faculty AC score was significantly higher than that of students ($t_{178} = 2.35, p = .020$), consistent with the expectation that faculty place greater emphasis on abstract conceptualization than students and beginning practitioners.

Chilean faculty had higher AE scores ($t_{48} = 2.53, p = .015$) than their students, and were more active learners ($t_{48} = 2.50, p = .016$), a pattern consistent with other reported findings that beginning practitioners are less active learners than experienced nurses (Haislett et al., 1993). However, Chi-square comparisons of the distribution of student and faculty learning style preferences at each institution showed no significant differences between the groups, consistent with the findings of other studies with faculty, students, and clinicians (Hodges, 1988; Joyce-Nagata, 1996).

Discussion

This is the first international study examining the learning styles of Canadian and Chilean nursing students in student-centred, self-directed programs.

The hypothesis that students entering an SDL/PBL curriculum would prefer reflective and abstract learning modes was not supported by the findings. Fewer than one third of students in each group demonstrated the high RO and AC scores characteristic of the assimilator style.

While the mean group AC scores of the OAC and Chilean students were slightly higher than those reported for junior and senior Canadian diploma nursing students (Rakoczy & Money, 1995), the group mean RO scores of all study groups were lower. The overall proportion of first-year students who were classified as abstract learners (54.3%) was similar to those reported by others (Ridley et al., 1995; Stutsky & Laschinger, 1995), though higher than that reported by Cavanagh et al. (1995). The predominance of abstract over concrete learning styles for the post-R.N. students differs from the reported findings of previous studies (Laschinger & Boss, 1983), as does the preference of abstract styles in the OAC sample (Cavanagh et al.). The preferred learning cycle selected by all but the OAC group is consistent with Rakoczy and Money's sample.

Post-R.N. students did not have higher active experimentation (AE) scores than basic students. The high AE scores for the three Canadian student groups are consistent with findings of prior reports that nursing students are active learners (Laschinger, 1986; Rakoczy & Money, 1995). The post-R.N. group had a lower AE mean score than both the OAC and non-OAC groups, though the differences did not reach a level of statistical significance. The predominance of the diverger style among the post-R.N. students contrasts with O'Kell's (1988) report of converger and accommodator styles among practising nurses. Compared with a sample of nurse managers (Daly, 1996), fewer post-R.N. students selected abstract and active learning styles. This may be reflective of the trend for younger nurses to return to school prior to having acquired managerial experience, or it may indicate that the transition to learner from practitioner results in decreased self-confidence (Callin, 1996).

The third hypothesis, that faculty teaching an SDL/PBL curriculum have high reflective observation (RO) and abstract conceptualization (AC) scores, was supported in part. The group mean RO scores were similar in both groups. The Chilean faculty members placed greater emphasis on the CE and AE modes than their Canadian counterparts, who in turn placed greater emphasis on abstract conceptualization.

There were differences between the Canadian and Chilean students. The preference of reflective learning by the Chilean students is consistent with findings that suggest nursing students are more reflective initially and become more active as they progress through their studies (Laschinger, 1986). The lower active learning (AE) scores of the Chilean student group are also more consistent with the traditional student role of passive learner, the predominant model in Chilean high-

school education. One of the challenges to educational change is to create a climate of faith and trust in a new system (Fullan, 1982). Although only a minority of the Canadian students had prior experience with PBL, several reported that SDL was not new to them.

The Canadian faculty group were predominantly (68.2%) abstract learners, similar to the reported styles of American (Marcinek, 1983) and English (Hodges, 1988) nursing faculty. The majority of Chilean faculty (61.5%) were concrete learners, consistent with reported findings with both Chinese (Duff et al., 1992) and Nicaraguan (Duff et al., 1995) nurse educators.

This study was limited in the conclusions that could be drawn due to the small sample size, although the response rates in each student group were satisfactory. A concern raised by the Chilean faculty members, which this study does not directly address, is the influence of the selection process on the level of motivation of students for SDL. No inferences can be drawn regarding the professional or academic success of students with differing learning styles, or of the stability of learning styles. Such work is necessary before curriculum changes can be initiated.

Conclusions

The LSI-1985 identified learning style preferences consistent with experiential learning theory and observations of diversity among students and peers. Faculty who teach in the small-group tutorial format report that diversity of student learning styles is one of the challenges in SDL/PBL.

The samples at both institutions were drawn from among the faculty who work with entry-level students. Most of these faculty members are also involved in clinical teaching, which may account for high AE scores in both groups. Further study is needed to explore whether differences between the two faculty groups may be reflective of differences in basic cultural values, or in the educational systems that both shape and reflect the role expectations and behaviours of teachers and students. Furthermore, at the time of the study, very few of the Chilean faculty members had pursued formal graduate education in nursing, which may have also influenced the lower abstract conceptualization scores compared with their Canadian counterparts, all of whom had graduate degrees in nursing.

The findings of the present study are consistent with those reported by other studies with nursing students, showing a diversity among stu-

dents and faculty in any given program. Since students entering these programs possess varied learning styles, faculty should consider providing a variety of learning experiences to help learners adjust to SDL and PBL. By completing the LSI-1985 as part of their orientation to SDL, the students became aware of the variety of learning strategies they can employ in developing their individual learning plans to meet course objectives in ways that suit their own learning style.

Helping learners to identify their own preferred learning styles will facilitate the development of independent and group learning skills. Faculty likewise need assistance in learning to identify, value, and respond to the diversity among students, and to engage in active, self-directed professional development to review and revise their own teaching strategies. A theoretical framework for identifying and analyzing different approaches to learning will support the move to student-centred, self-directed curricula for both faculty and students.

Based on the findings of this study, the LSI-1985 appears to be a valid instrument for use in an international study of learning styles of nursing students, in that it identified differences among learners consistent with the experiential learning theory upon which it is based. Future research will include further testing of the Spanish version of the LSI-1985, cross-cultural comparisons with other nursing programs, and a longitudinal study of learning styles.

References

- Barrows, H.S. (1985). *How to design a problem-based learning curriculum for the pre-clinical years*. New York: Springer-Verlag.
- Barrows, H.S., & Tamblyn, R. (1980). *Problem-based learning PS*. New York: Springer-Verlag.
- Brown, B., Carpio, B., & Roberts, J. (1991). The use of an autobiographical letter in the nursing admissions process: Initial reliability and validity. *Canadian Journal of Nursing Research*, 23(2), 9-20.
- Callin, M. (1996). From RN to BScN: Seeing familiar situations in different ways. *Journal of Nursing Education*, 27, 28-33.
- Carpio, B., & Brown, B. (1993). The admission process of a Bachelor of Science in Nursing program: Initial reliability and validity of the personal interview. *Canadian Journal of Nursing Research*, 25(3), 41-52.
- Cavanagh, S.J., Hogan, K., & Ramgopal, T. (1995). The assessment of student nurse learning styles using the Kolb Learning Styles Inventory. *Nurse Education Today*, 15, 177-183.
- College of Nurses of Ontario. (1996). *The learning plan: My projects for improvement. Professional Profile Portfolio* (pp. 73-82). Toronto: Author.

- Cowman, S. (1995). The teaching/learning preferences of student nurses in the Republic of Ireland: Background issues and a study. *International Journal of Nursing Studies*, 32, 126-136.
- Cranston, C., & McCort, B. (1985). A learner analysis experiment: Cognitive style versus learning style in undergraduate nursing education. *Journal of Nursing Education*, 24, 136-138.
- Crook, J. (1985). A validation study of a self-directed learning readiness scale. *Journal of Nursing Education*, 24, 274-279.
- Daly, R.C. (1996). Nurse manager learning styles in a learning environment. *Seminars for Nurse Managers*, 4, 107-121.
- DeCoux, V.M. (1990). Kolb's learning styles inventory: A review of its application to nursing research. *Journal of Nursing Education*, 29, 202-207.
- Duff, M., Laschinger, H., Arguello, O., Sandino, R., & Samora, L.R. (1995). Estilos de aprendizaje: Enfermeras nicaraguenses y canadienses. *Revista de la Escuela de Enfermería de la Universidad Politécnica de Nicaragua*, 2(1), 3-13.
- Duff, V., Johnston, N., & Laschinger, H. (1992). Learning styles of Chinese nursing faculty and career choice preferences. *Journal of Advanced Nursing*, 17, 229-233.
- Fullan, M. (1982). *The meaning of educational change*. Toronto: OISE Press.
- Griggs, D., Griggs, S.A., Dunn, R., & Ingham, J. (1994). Accommodating nursing students' diverse learning styles. *Nurse Educator*, 19(6), 41-45.
- Haislett, J., Hughes, R., Atkinson, G., & Williams, C. (1993). Success in baccalaureate nursing programs: A matter of accommodation? *Journal of Nursing Education*, 32, 64-70.
- Highfield, M. (1988). Learning styles. *Nurse Educator*, 13(6), 30-33.
- Hodges, S.A. (1988). Individual learning styles of student nurses, their teachers and ward sisters. *Journal of Advanced Nursing*, 13, 341-344.
- Holbert, C., & Thomas, K. (1988). Toward whole brain education in nursing. *Nurse Educator*, 13(1), 30-34.
- Hunt, D. (1987). *Beginning with ourselves: In practice, theory and human affairs*. Toronto: OISE Press.
- Jambunathan, J. (1995). Using Kolb's LSI to study learning styles of junior baccalaureate nursing students. *Nurse Educator*, 20(3), 7.
- Jones, E. (1987). Translation of quantitative measures for use in cross cultural research. *Nursing Research*, 36, 324-327.
- Joyce-Nagata, B. (1996). Students' academic performance in nursing as a function of student and faculty learning style congruency. *Journal of Nursing Education*, 35(2), 69-73.
- Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*. New York: Association Press.
- Knowles, M. (1986). *Using learning contracts: Practical approaches to individualizing and structuring learning*. San Francisco: Jossey-Bass.

- Kolb, D.A. (1984). *Experiential learning: Experience as the source of knowledge and development*. Englewood Cliffs, NJ: Prentice-Hall.
- Kolb, D.A. (1985). *Learning style inventory: Self-scoring inventory and interpretation booklet*. Boston: McBer.
- Laschinger, H. (1986). Learning styles of nursing students and environmental press in two clinical nursing settings. *Journal of Advanced Nursing*, 8, 289-294.
- Laschinger, H. (1990). Review of experiential learning theory research in the nursing profession. *Journal of Advanced Nursing*, 15, 985-993.
- Laschinger, H. (1992). Impact of nursing environment on the adaptive competencies of baccalaureate nursing students. *Journal of Professional Nursing*, 8, 105-114.
- Laschinger, H., & Boss, D. (1989). Learning styles of baccalaureate nursing students and attitudes toward theory-based nursing. *Journal of Professional Nursing*, 5, 215-233.
- Laschinger, H., & Boss, M. (1983). Learning styles of nursing students and career choices. *Journal of Advanced Nursing*, 9, 375-380.
- Marcinek, M. (1983). *An analysis of learning styles of RN students, basic nursing students and nurse educators in a baccalaureate nursing program* [CD-ROM]. Abstract from: ProQuest File: Dissertations Abstracts Item: 8318754.
- Meleis, A., & Price, M. (1988). Strategies and conditions for teaching theoretical nursing: An international perspective. *Journal of Advanced Nursing*, 13, 592-604.
- Merritt, S. (1983). Learning style preferences of baccalaureate nursing students. *Nursing Research*, 32, 367-372.
- Montecinos, P., Illesca, M., & Yanez, A. (1993). Preferencias de aprendizaje en estudiantes de una escuela de medicina chilena, estudio longitudinal. *Revista Medica Chilena*, 121, 220-225.
- O'Kell, S.P. (1988). A study of the relationship between learning style, readiness for self-directed learning and teaching preferences of learner nurses in one health district. *Nurse Education Today*, 8, 197-208.
- Phillips, L., Luna de Hernandez, I., & Torres de Ardon, E. (1994). Strategies for achieving cultural equivalence. *Research in Nursing & Health*, 17, 146-174.
- Rakoczy, M., & Money, S. (1995). Learning styles of nursing students: A 3-year cohort longitudinal study. *Journal of Professional Nursing*, 11, 170-174.
- Remington, M., & Kroll, C. (1990). The "high-risk" nursing student: Identifying the characteristics and learning style preferences. *Nurse Education Today*, 10, 31-37.
- Ridley, M., Laschinger, H., & Goldenburg, D. (1995). The effect of a senior preceptorship on the adaptive competencies of community college nursing students. *Journal of Advanced Nursing*, 22, 58-65.
- Smith, D., & Kolb, D. (1986). *User's guide for the learning styles inventory: A manual for teachers and trainers*. Boston: McBer.

- Stutsky, B., & Laschinger, H. (1995). Changes in student learning styles and adaptive learning competencies following a senior preceptor experience. *Journal of Advanced Nursing*, 21, 143-153.
- Thompson, C., & Crutchlow, E. (1993). Learning style research: A critical review of the literature and implications for nursing education. *Journal of Professional Nursing*, 9, 34-40.
- Tompkins, C., & McGraw, M.J. (1988). The negotiated learning plan. In D. Boud (Ed.), *Developing student autonomy in learning* (2nd ed.). London: Kogan Press.
- Wells, D., & Higgs, Z. (1990). Learning styles and learning preferences of first and fourth semester baccalaureate degree nursing students. *Journal of Nursing Education*, 29, 385-390.
- Wubbels, T., & Levy, J. (1991). A comparison of interpersonal behaviour of Dutch and American teachers. *International Journal of Intercultural Relations*, 11, 1-18.

Author Note

Data analysis was conducted by Mr. Ernie Avilla, Research Assistant, Nursing Education Research Unit (NERU), McMaster University School of Nursing.