Learning Style Differences between Nursing and Teaching Students in Sweden: A Comparative Study

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Abstract

The teaching profession has been continually challenged to provide evidence of the effectiveness of teaching and learning methods. Teacher education, as well as nursing education, is currently undergoing reforms in Sweden. At the university where the research was conducted, teaching and nursing programs are two priority educational programs and maybe knowledge of learning styles can improve the quality of these programs. The purpose of this research was to examine the learning style preferences for two student groups, teachers and nurses, to analyze their differences in light of international research on learning styles. The study involved 78 teaching students and 78 nursing students. Twenty subscales of the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn, & Price, 1984; 1991; 2000) were used to identify the participants' learning style preferences. The results showed statistically significant differences between the two student groups. In comparison to teaching students, more nursing students were highly motivated, kinesthetic, and preferred authorities. More teaching students were highly persistent. The findings suggest the need for widely diverse teaching approaches and conscious didactic action skills in higher education, as well as implementation of learning strategies for students.

Keywords: Learning style preferences, Nursing students, Teaching students, Teaching strategies

1. Introduction

Students at colleges or universities are struggling to cope with their studies and the unique demands imposed by particular courses (Boström, 2011a). Many students try to develop efficient study skills and acquire appropriate learning strategies. Swedish students at universities are offered a large number of coaching and academic courses dedicated to developing study techniques, such as learning strategies, speed reading, and note taking. However, students show a great deal of individual differences in their approaches to learning, and so do their teachers. The utility of matching teaching methods to learning styles has been widely debated (Redmond, 2010), but when students are presented with learning new and difficult information, research shows significant improvement when individual learning styles are matched to instructional strategies (Dunn & Griggs, 2007; Lauridsen, 2007). Matching has been effective, both in terms of grades and meta-cognitive development of students in different fields such as law (Boyle, 2000), engineering (Ingham, 1989) teacher education (Burke, 2000) and nursing education (Dunn & Griggs, 1998). The question is whether the students´ learning style patterns are different in the various education programs. If educators in higher education understand learning styles at a group level and takes this into account and if students assimilate knowledge at the individual level, some positive results could be achieved. Educational programs could be more effective because you can "customize" them, students' performance can be improved, student throughput can increase, which in itself is positive from an economic perspective. Another important aspect of embracing learning styles is that students' meta-cognitive skills can be developed and thereby lay a solid foundation for lifelong learning. Both professional groups work with people, they are supervisors and have different types of teaching situations. In both professions, it is important to know oneself and to understand the others (patients / students). Nursing and teaching training are all over the world, and are probably the key courses. There is much to learn from each other, both between programs and internationally.

The aim of this study was to examine differences and similarities in learning styles of two groups of students: a)

nursing students, and b) teaching students for compulsory school.

2. What are Learning Styles?

The topic of "learning styles" may refer to more than 70 different published models, often with self-contradictory assumptions about learning, different research and instructional designs, and different starting points (Coffield, Ecclestone, Faraday, Hall, & Moseley, 2004). There are many different theories and models of learning styles with varying dimensions and characteristics; different theories focus on different aspects, cognitive processes, personality descriptions, talents, sensory modalities, learning processes, thinking styles, etc. (Riding & Rayner, 1998). In general, learning styles theories assume that all may learn, though in different ways and at different levels. The area is comprehensive and addresses both individual and group levels, but also affects organizations as a whole (Stensmo, 2006).

In Scandinavia, the two most well-known learning styles models are Kolb's Learning Styles Model (Honey & Mumford, 1985), which describes the brain process and is frequently used as a starting point in problem based learning (Hård af Segerstad, Klasson, & Tebelius, 1996) and the Dunn and Dunn Learning Styles Model (Note 1) (Boström, 2004a), which is multidimensional and widely used with children, adolescents, and adults, and is very applicable to the education of health professionals (Dunn & Griggs, 1998; 2007). Compared with other learning styles assessments, PEPS (Productivity Environmental Preference Survey) is unique in the sense that it covers many preferences, students can work with it as a basis for lifelong learning to develop learning strategies, and teachers have a concrete basis for methodological and didactic choices.

Dunns´ Model focuses primarily on the acquisition of new and difficult information, and is probably one of the most comprehensive, researched, and practiced learning styles theory (Lauridsen, 2007). Learning style is defined "… as the way each learner begins to concentrate on, process and retain new and difficult information" (Dunn, Dunn, & Perrin, 1994, p. 12). The model covers several dimensions of learning and teaching and has practical and methodological tools in the research, which is unique concerning learning styles research (Dunn & Griggs, 2007; Lauridsen, 2007). Fifty years of research, both quantitative and qualitative, has shown there are different learning style factors (also called elements), and they can be measured. These elements are divided into five different areas (stimuli): environmental, emotional, sociological, physiological, and psychological that, in varying degrees, affects every individual.

These 20 elements have, in qualified international research, revealed a variety of construct validity evidence (Dunn, Griggs, Olson, Gorman, & Beasley, 1995). Learning style is comprised of both biological and development preferences that make the identical instructional environments, methods, and resources effective for some learners and ineffective for others (Thies, 1999/2000). At the individual level, it is essential to be aware of what affects motivation, concentration, and retention, and then to match it in style (www.learningstyles.net). This learning style model is directly applicable in learning situations and should not be confused with psychological models or tests.

3. Previous Research

There are more than 900 scientific studies on the Dunns´model, of which about 400 are doctoral dissertations and the others scientific articles. Research on the implementation of this model is spread over 130 universities worldwide in the United States (Whitley & Littleton, 2000); Sweden (Boström, 2004a; 2011a; Calissendorff, 2005); Norway (Buli-Holmgren, Guldahl, & Jensen, 2007); Hungary (Honigsfeld, 2001); Brunei (Pengrad-Jadid, 1998); Bermuda (Bascome, 2004); Germany (Hlawaty, 2002); and Russia (Ulubabova, 2003). However, no study found has compared completely separate education programs.

3.1 Learning Styles in Higher Education

There are about 70 international studies on Dunns´ Model that apply to higher education. Experimental research with college students has documented significantly higher achievement in a wide range of disciplines - bacteriology, legal writing, marketing, and physics - when learning styles based instruction was used in comparison with traditional teaching methods (Mangino & Griggs, 2007).

A couple of studies in Scandinavia on Dunns' Model in higher education have been published: Boström, (2011a), and Boström and Löfquist (2012), which will be described later in the text; and Calissendorff (2008) and Stensmo (2006). Calissendorff (2008) examined prospective music teachers' attitudes about learning styles preferences. Stensmo's (2006) study compared a group of teaching students in practical aesthetic subjects in terms of perceptual preferences, with a normal distribution of teachers' groups. Future teachers in practical aesthetic subjects seemed to learn more kinesthetically (whole body involved) as compared to traditional future teaching students. Awareness of individual learning styles also seems to affect meta-cognitive skills and the ability of students to utilize personal strategies (Boström, 2004b; Boström & Lassen, 2006; Hamlin, 2001; Schering, 1999).

3.2 Learning Styles and Nursing Students

There is a great need for research on learning styles preferences in groups of nursing students. In Western settings since 2002, few studies linked to the Dunns' Model have been published, and no study was found on Swedish health care education. The few existing studies - the majority from the United States - report significantly increased achievement in the profession when students have studied with strategies congruent to their learning style preferences (Dunn & Griggs, 1998; 2007). For example, anesthesiology students who were aware of their learning styles showed both less anxiety and improved clinical performance than those who were not (Garcia-Otero & Teddlie 1992). Other authors show that nursing students' satisfaction, anxiety, and anger are related significantly with sessions and self-taught when teachers and instructors reflect on their perceptual preferences (Hamlin, 2001; Lenehan, 1994; Miller, 1997; O'Hare, 2002). Ingham (1991) found that with the PEPS instrument, 40 percent of college health care students were visual learners and less than 25 percent were auditory learners. Furthermore, interactive instructions, as well individual motivation and responsibility correlated positively with students' grades (Billings & Cobb, 1992).

Learning style instruments yield outcomes specific for each model. One that is less used, but well matched with the PEPS, is Fleming's (1995) VARK test: visual, aural, reading/writing, kinesthetic sensory modalities, which determines specific ways of receiving information. Results with the VARK test have identified that the majority of first-year nursing students were highly kinesthetic, learned by doing (James, DÁmore, & Thomas, 2011; Meehan-Andrews, 2009), and highlighted lectures and tutorials useful for their learning (James et al., 2011). The same study also reported rural nursing students had significantly higher visual and kinesthetic scores, and higher visual and read-write scores compared to metropolitan students (James et al., 2011). Moreover, research teams found nursing students' learning styles profiles can change between two measurement points (Fleming, McKee, & Huntley-Moore, 2011), tends to change the longer students remain in school, and continues to change as they grow older (Dunn & Griggs, 1995).

3.3 Learning Styles and Teaching Students

There is also a great need of research on learning styles in teacher education partly because of the diversity of students teachers face in the classroom, but also due to their own professional development in didactics and leadership. There is international research on learning styles and teaching student profiles in other learning styles models, e.g Sywelem, Al-Harbi, Fathema, and Witte (2012), which describes cultural style differences among teaching students. Boström's (2011b) study involved teaching students and music teaching students, and it showed statistically significant differences between the two groups. Compulsory teaching students differed in their choice of more formal designs, routines, time of day and preferences for learning alone. At Stockholm Music Education (SMI), learning styles assessments are given, with follow up dialogues for all students. Calissendorff's qualitative evaluation strategy (2008) provided insight into the music students' thoughts about the revaluation of learning: their own as music teaching students and the educational programming of the students they taught. The students believed that knowledge of human diversity in learning affected their thinking on a deeper level.

Boström and Löfquist's (2012) study deals with teaching students' performance relative to their learning styles, profiles, and strategies. These researchers found students' study results depended on styles, strategies, and teaching strategies at the university level for teaching students. Their findings suggest the need for widely diverse teaching approaches in teacher education.

However, there are many studies conducted on teaching students and teaching methods, (e.g. Egal, 2009; Hart & Dunn, 2008; Honigsfeld & Schiering, 2004) that show both matched and mismatched methods, but also show teaching students´ and teachers´ attitudes toward learning styles based methodology. There are also many studies conducted in the United States about the use of learning styles pedagogy in teacher training education and in-service training for teachers (Burke, 2000; Dunn & Burke, 2007; Whitley & Littleton, 2000). The research results show that teacher education should offer teaching students different perspectives in learning styles pedagogy.

4. Method and Purpose

This study was designed to compare nursing students to teaching students at compulsory school to see whether, and how, they differ as groups. If they do differ, what are the plausible explanations and didactic implications? The following hypothesis was generated:

H 1: There will be significant differences in learning styles preferences between nursing students and teaching students.

4.1 Participants

Empirical data were collected in 2009 – 2012. There were 156 randomly selected second- and/or third year-students from several groups in the study, from one rural university in Sweden. This study of 156 students included 22 men and 134 women. The division between the two groups was 78 nursing students, and 78 teaching students.

As shown in Table 1, most students were less than 30 years old. The nursing students, as a group, were younger than the teaching students, and consisted of 17 men compared to five in the group of teaching students. Further, the nursing students had much higher admissions score.

Table 1. Information for the sample by gender, ages and admission scores

Program		Nursing students	Teaching students
Gender	Female	61 (78%)	73 (94%)
	Male	17 (22%)	5 (6%)
Ages	21–30 years	62 (79.5%)	36 (46.1%)
	31–40 years	15 (19.2%	30 (38.5%)
	41–50 years	1 (1.3%)	10 (12.8%)
	52–60 years	0	2 (2.6%)
Admission scores	BG* on average	15.8 (Range 9.6-17.8)	11.2 (Range 9.4-14.2)
Total		78	78

* BG = Students with grades from high school and adult education (maximum points 20)

4.2 Materials

The Productivity Environmental Preference Survey (PEPS), (Dunn et al., 1984; 1991; 2000) was used to identify the learning styles preferences of the participants. The PEPS analysis consists of 100 items, each with five Likert-type scale points. To reduce response sets, some of the items were reverse-worded with reversible issues. The Likert formats ranged from 1 (definitely disagree) to 5 (absolutely agree).

The PEPS can be answered in approximately 25 minutes. Data collected from this assessment yielded computerized profiles of each student's preferred learning styles traits based on the 20 variables. The PEPS has repeatedly evidenced predictive validity (Dunn et al., 1995; Nelson et al., 1993) and the reliability coefficients for each element typically falls into the .75 to .88 range (Dunn et al., 1995). The Swedish translation of the instrument was utilized. Example of a PEPS profile is added in appendix 1. Responses were processed by computer to obtain scores for each individual on each subscale; rescales have a mean of 50 and a standard deviation of 10.

4.3 Method Discussion

The strength of this study was the results generated from a well proven instrument with high reliability and validity (Dunn et al., 1995; LaMothe et al., 1991; Nelson et al., 1993). But as with all surveys, the results presented here should be seen as "snapshots." It is known that learning styles can change over time (Fleming et al., 2011), which suggests the need for repeated measurements.

The study is limited to a single rural university with a diverse student population, but is strengthened with groups from the university´s three campuses. Comparisons were made between two professional groups and the sample (78 + 78) was good enough given the selected design (Creswell, 1994; Hassmén & Koivula, 1996). Since authors have described differences between rural and metropolitan nursing students (James et al., 2011), an interesting thought is if and how the rural environment of the university has influenced students learning preferences.

A central weakness to the method is that it employs only one learning styles inventory. Multi-method design would have strengthened the results further. However, the intention was to perform a pilot study and generate a basis for further research. As there is no Swedish learning style studies with nursing students and the PEPS instrument the results will provide valuable knowledge and good reference material for further surveys and experimental studies at various campuses regionally, nationally, and internationally. Triangulated quantitative and qualitative studies are needed too.

4.4 Ethical Considerations

Ethical considerations were raised during the research process. Research Council's ethical norms (www.vr.se) were followed in the study and answered the issue of individual protection with regard to information, consent, confidentiality and use. The informants were asked about the study and information was given about its purpose, rules of procedure, and possible future use. All participants were involved voluntarily in the study after a presentation and assurance of confidentiality. Each individual was guaranteed anonymity via encoding of names. The findings are therefore not linked to the individual.

5. Results

The hypothesis of significant differences in learning styles preferences between teacher and nursing students was confirmed. Table 2 shows distributions of low-, flexible-, and high-preference scores for each of the PEPS subscales for both groups of students. The individual profile shows an average for each question on a 60-point scale, although group profiles with mean values of each element will be added. They also marked each student's values as low (average 21-40), flexible (average 41-60) and high (average 61-80). These values were calculated at the individual level for each group and used for the interferiel statistics. The descriptive statistics are thus based on the exact mean of each element, while the interferiel statistics are based on averages for each individual classified in main groups: low, flexible or high (mean). In order to explore group differences, a series of two (group) by three (score level) chi-square tests were computed, along with the Cramer's *V* effect size statistic. As can be seen in Table 2, most subscale scores fell essentially between 41 and 60; the "flexible" region of no strong preferences. Students in this middle range are without any special accommodations to their learning styles preferences as long as they are interested in the content. When not interested, they learn superficially and are engaged only in short-term memory (Dunn & Griggs, 2007). However, Table 2 also shows that large percentages of nursing students and teaching students had scores that fell below 40 and above 60 on each of the learning style elements, indicating that they would benefit from special accommodations to their learning styles preferences.

Table 2. Distribution of low, flexible, and high preference scores for nursing students and teaching students

ELEMENTS	**low**	**21-40**	**flexible**	**41-60**	**high**	**61-80**			
	Nursing	**Teaching**	**Nursing**	**Teaching**	**Nursing**	**Teaching**	**Chi-square**	**Sign.**	**V**
Noise level	0	0	60	60	18	18	0.00	ns	0.00
Light	4	17	67	58	7	3	10.31	**	0.257
Temperature	11	13	56	52	11	13	0.48	ns	0.56
Design	4	5	61	53	13	20	0,46	ns	0.34
Motivation	1	12	66	53	11	13	10.89	***	0.246
Persistent	0	4	53	44	25	30	5.29	*	0.184
Responsibility	9	14	63	51	6	13	4.93	ns	0.178
Structure	0	1	12	21	66	56	4.27	ns	0.166
Alone-Peers	3	6	24	38	51	34	7.56	ns	0. 023
Authorities	0	8	47	53	31	17	12.44	***	0.282
Several Ways	9	12	67	65	2	1	0.73	ns	0.71
Auditory	5	5	53	53	20	20	0.00	ns	0.00
Visual	11	14	56	58	11	6	1.86	ns	0.109
Tactile	1	4	59	50	18	24	3,80	ns	0.148
Kinesthetic	0	4	52	62	26	12	10,04	**	0.254
Intake	12	4	52	43	14	31	11.28	***	0.269
Morning	9	14	55	36	14	28	9.72	**	0.250
Late morning	12	12	45	41	21	25	0,54	ns	0.059
Afternoon	10	19	46	36	22	23	4.04	ns	0.161
Mobility	3	0	57	62	18	16	3.29	ns	0.146

A review of Table 2 indicates that seven of the PEPS subscales show statistically significant differences between the two student groups. Thus, more nursing students than teaching students preferred bright lights ($p < .01$), were more motivated ($p < .001$) and kinesthetic ($p < .01$), and preferred working with an authority person ($p < .001$). More teaching students than nursing students preferred intake ($p < .001$), morning work ($p < .01$), and were more persistent ($p < .05$).

There were a lot of similarities in the two groups (see Figure 1a and 1b); three quarters preferred structure, and half preferred working with peers, while about one quarter to one third were auditory, tactile, and preferred mobility, late mornings or afternoon. Both groups contained students with low responsibility who could question traditional working. No significant differences were found between the elements of the PEPS and the students' age, but concerning gender, there were tendencies for significant differences about motivation and time of day. According to Table 1, teaching students' admission scores were lower compared to nursing students'.

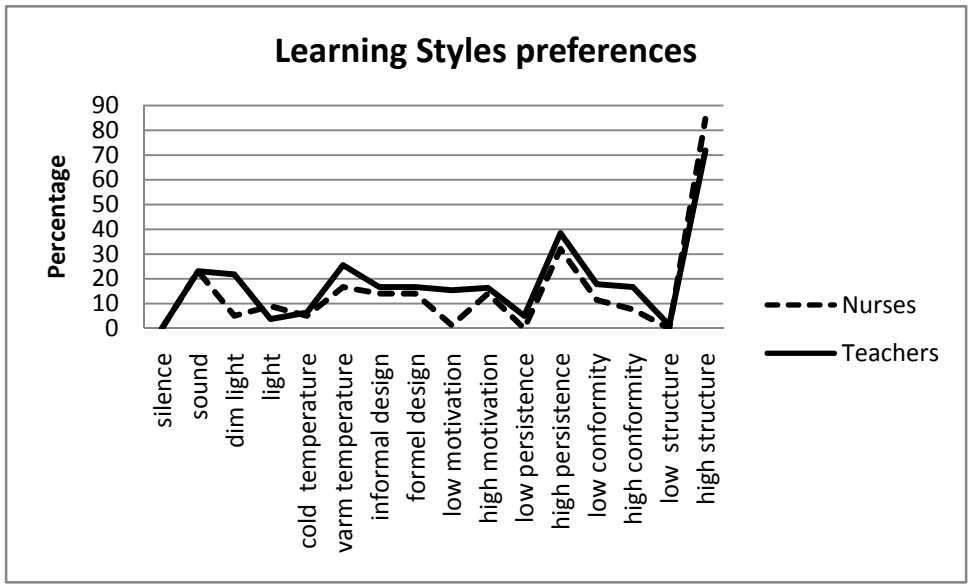

Figure 1a. Percentage distribution of learning styles preferences

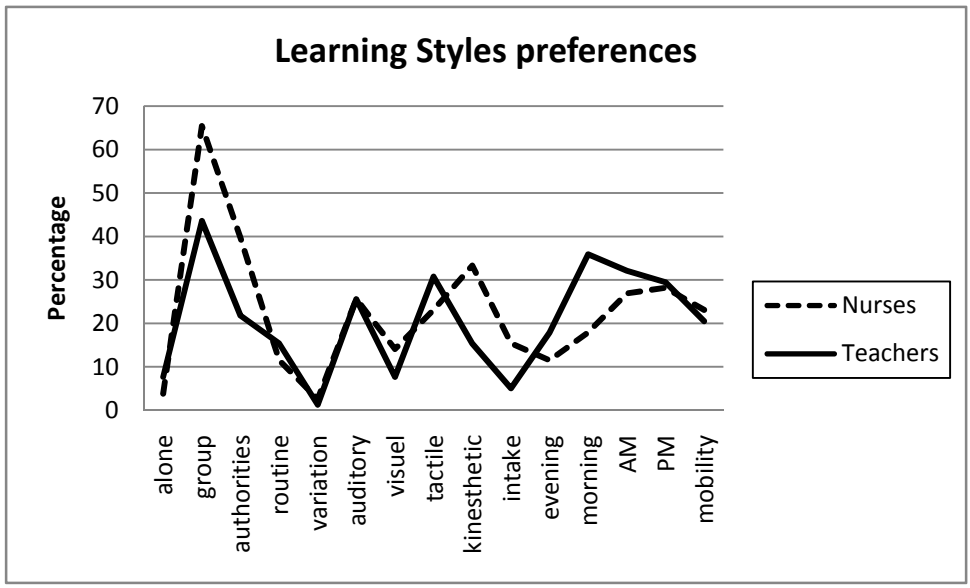

Figure 1b. Percentage distribution of learning styles preferences

6. Discussion and Implications

The aim of this study was to examine differences and similarities in learning styles of two groups of students in higher education. The results illustrate that nursing and teaching students at a rural university in Sweden differed and didn't differ in their learning style preferences. Since no previous study has compared nursing students and teaching students, this result should be seen as new and unexplored field of research.

6.1 Group Differences

Statistically significant differences between the two student groups were shown, particularly motivation, kinesthetic learning, need for authorities, and persistence. There were also environmental differences, but those will not be discussed because of difficulties in satisfying these preferences at college and university. Students can customize their study environment at home.

One of the most interesting findings was that more nursing students than teaching students reported higher *motivation* concerning learning styles preferences ($p < .001$). The difference between the groups is interesting because the students were in the final stages of their education and soon would be ready to enter into a professional function with large personal liability to third parties. An important question to raise is if nursing and teaching students are seeking education for different motives, and what role the students´ different admissions scores played. Both groups had, in general, relatively low admission scores, but teaching students had the lowest. To learn something one is not interested in, and with inadequate entry knowledge, is extremely difficult, and according to Dewey (1964), negative emotions such as anxiety and bad feelings can block learning. Low admission scores are probably partially related to the courses run by a young rural university where the search pressure is lower compared to established metropolitan institutions.

The dignity of examination certificates might also play an important role for motivation. Nurses examined by the National Board formulate competence requirements (SOSFS, 2005), and nurse licenses are presented at appointment. Teaching students do not have the same requirements, but can improve themselves for their own personal development without much interest in education or meeting students needs. They also know that unqualified teachers may be appointed. Teaching students' intrinsic motivation can hopefully improve quickly when teacher certification is introduced in Sweden.

Since motivation stems from interest (cf. Dewey, 1964) nursing students will probably choose nursing education as their first choice. According to the low admission scores, teaching is usually not a high-status profession chosen in the first place in Sweden. How motivation influences performance is not addressed in this study, but Billing and Cobb (1992) found a positive correlation between nursing students' motivation and grade-point averages. According to Dunn and Griggs (2007), if the interest in the subject falters students learn superficially and are engaged only in short-term memory.

The results showed nursing students' had a greater need for *kinesthetic learning*, the learning by doing approach, ($p < .01$), which is in line with earlier results (James et al., 2011; Mehan-Andrews, 2009). Those authors found nursing students prefer kinesthetic learning, which is probably explained by their knowledge about the profession and that nursing students combine theoretical studies with practical exercises, (cf. Dewey, 1964; Schön, 1987). Central in Dewey's philosophy is the continuum of experience that promotes or inhibits motivation and learning. Our result suggests that nursing educators consciously choose even more teaching methods such as low- and high-fidelity patient simulation containing nontechnical and technical skills essential for patient safety. Teacher educators should introduce similar nontechnical simulation adapted for children and adolescents.

Teaching students are not grouped by direction, so the outcome could be different if preschool teachers, primary teachers, and other teachers were distinguished. Again, an outstanding question is whether people with specific learning styles preferences seek out specific occupations (cf. Furnham, Jackson, & Miller, 1999; Furnham, Christopher, Garwood, & Martin, 2008).

More nursing students than teaching students had a greater *need for authority* ($p < .001$). The most plausible explanation may be that nursing as a job is more a matter of life and death, and governed by laws and regulations, which may mean it is important to have a line of authority. Teaching students, on the other hand, are brought up in a collegial learning environment to a greater extent without danger of immediate harm to a third party. Nursing teachers are naturally involved in situations where students are trained and examined under supervision. Further, nursing students' satisfaction, anger, and anxiety have been shown to be significantly related to teachers' and instructors' reflections on their thoughts and actions (Hamlin, 2001; Mehan-Andrews, 2009; Miller, 1997; O'Hare, 2002). Students' reflection in different variations, as reflected in action and reflected on action (Schön, 1978), is

crucial and an absolutely necessary gateway to avoid repetition of bad outcomes.

More teaching students than nursing students were *persistent* ($p < .05$), which is somewhat surprising because both educations leads to stressful professions. However, it may be because the teaching students academically can focus on a topic and complete one assessment task at a time. Nursing students, by contrast, often have several examination tasks related to different topics in each course, which may contribute to the start of a task, take a break, start another task, and perhaps end the most interesting task and let others remain unfinished. In practice, such an approach will be impossible. Both nurses and teachers have to act out of the needs of knowledge and others need, not out of interest.

6.2 Group Similarities

In the two groups there were *many multimodal students*, flexible in their learning styles, who likely could adapt their studies to the teaching methods their teachers choose. So it was obvious there were students who could question traditional working and abstain from conventional lectures with auditory and visual methods. The result is in line with the study of Billings and Cobb (1992), but in contrast to the results of James et al. (2011), who found first-year students highlighted lecturers and tutorials. However, learning styles can change (Fleming et al. 2011), so the question reveals if the need for lectures decreases with the number of years at college. In our study, one third of the students in their second and third year were auditory and/or tactile learners and/or preferred mobility, while the majority preferred structure and working with peers.

On average half of the students in both groups preferred working *with peers*, which is very high (28% overall) among international groups, according to Dunn and Griggs, (2007). Given that they are a couple of years into their academic studies, this may be an adaptation to the need to observe the actions of others, group discussions, and reflections in order to think critically and translate theoretical knowledge into real problem based situations, for instance role play scenarios (cf. Dewey, 1964; Schön, 1978). Dewey highlights the action as it closes the learning cycle by bringing the inside world of reflection and thought into contact with the outside world of experiences created by action. According to Schön, reflection is also important to identify learning needs and to increase motivation.

About three of four students in our study preferred *structure* and felt they performed best when given clear directives and guidelines on how and what is required before starting a job. The need is, of course, a fact that teachers take into account, but somewhat surprising since these students who were completing their university education probably did not have enough confidence to fulfill professional and problem solving tasks. Here students need collide with university teachers' expectations. The question is whether the students have developed their learning style enough for problem solving and lifelong learning. Given that students become aware of the learning outcomes, there should be more students who have achieved the approach of "I do it my way." It is likely that students with a dissonant study profile find it difficult to make sense of the demands of their program.

No significant differences were found between the elements of the PEPS and the *students' background variables*. This is also confirmed by other authors who used other instruments; the case with The Kolb learning style inventory (Cavanagh, Hogan, & Ramgopoal, 1995) and the VARK test (James et al., 2011). However, based on the sample it should still be considered that there were more young students and students with higher admission points in the group of nursing students. In both groups men were in minority, and the fact that only 14 % of the sample was male is perhaps a factor of bias.

6.3 Learners and Teachers

With regard to the two studied populations, it has not been possible to compare these two student groups with similar international groups since such studies are not available. In a recap of international studies on different populations, it should be noted that there are often differences between various groups (James et al., 2011), but the individual variations are greater (Dunn & Griggs, 2007).

The teacher's role in collaboration with students and colleagues should be twofold; to vary the teaching and didactics primarily based on each student group, and to be attentive to individual needs. Burke (2000) points out that it is particularly important to pay attention to the emotional elements such as motivation, structure, and persistence, and the need to give each student individual study strategies after taking the learning styles assessment. She also points out the need to adjust instructional methods for the different groups. All those recommendations highly include teachers themselves too, that in teams develop coherent pedagogical strategies to achieve interaction, job satisfaction and lifelong learning for their own. Students, for their part, must take responsibility for understanding their specific learning style as well as training and developing effective learning strategies. This applies both to teacher and nursing education.

Since learning styles can change during education (Dunn & Griggs, 1995; Fleming et al., 2011), it emphasizes the importance of regular testing. The advantage of the PEPS instrument is that it exists on-line for accessibility and is programmed for immediate data analysis. Thus, annual "snapshots" can provide students and teachers with regular information, and good a basis to individuals and groups to adapt learning and didactics (Boström & Lassen, 2006; Thies, 1999/2000).

The Faculty should, at the beginning of a program, offer academic support in the form of mentoring where students can communicate about their strengths and weaknesses (cf. Calissendorff 2008; Boström & Löfqvist 2012). Through goal-talks mentors create fuel for persistence, desire, commitment, and tools for lifelong learning. This is possible if the relationship between students and mentors are long-term and if the dialogues consist of reflections and affirmations that strengthen self-esteem and raise career opportunities (cf. Dewey, 1964; Schön, 1978). Such meta-cognition makes it possible for students to know themselves and work from conscious decisions. Similarly support groups and workshops should be set up for teachers. An ideal base for such discussions should be that teachers are utilizing the learning style instrument to inventory their own preferences. "You live what you preach".

6.4 Practical Implications

The implications of this study may relate to a) teaching strategies at universities, b) the importance of students being aware of and developing their meta-learning in order to better cope with studies, c) prospective teachers and nurses understanding their own style and repercussions on their leadership, d) understanding students'/children's and patients'/staffs' learning styles.

Conclusions to draw from this study for both populations are students' high need for structure and peers. Many students who enrolled in these two universities (60-78%) learn better when they have frameworks, assumptions, plans, and practices on how they should learn difficult and new knowledge. If these students are given more structure and have opportunities to work with peers, they will probably be more creative and efficient. However, this is not entirely consistent with The Higher Education Act and its demand for independence and solo study responsibilities (Högskolelagen, 1992:1434). This also applies to starting and maintaining the strongest driving forces for learning, interest, and motivation, where society and the media have a great responsibility.

Our results will certainly be most valuable to teachers and students in teaching and nursing programs, but should also be a good basis for counselors and other teachers at national and international universities. How the results will be used depends of course of the institutions in question. Proven experience and international research show that the biggest barrier to change the prevailing pedagogy or implement new teaching methods is the context, the culture and the teachers' mentality (Dunn & Griggs 2007). Innovation and requirements for development, especially in already heavy workload, induce conscious or unconscious defense mechanisms that make proposals for action untested. Other barriers are the number of students, the economy and the availability of educated teachers who can lead workshops and take on the mentoring role.

6.5 Summary

The hypothesis that there are significant differences in learning styles preferences between teaching students to nursing students was confirmed. Educational research should have repercussions for higher education. If matching groups with instructional methods, effective programs can be created and reduce the number of dropouts. The results of such studies like this can provide input that helps teachers examine their beliefs about pedagogy, which student groups will be best suited for specific pedagogical solutions, e.g. e-learning and problem based learning, and how to supervise different students in academic subjects. Other didactic questions to pose are the following: How to use PowerPoint, lectures, and practical exercises for different students in a conscious way. What about suitable assessments when we know that students learn in different ways and require different didactic solutions?

Thus, different courses should have different designs, training plans, flexible leadership among teachers, choice of teaching materials, and various tutoring methods for matching each student group. However, this can only be realized through greater awareness among university teachers. In other words, we believe that university education can take advantage of learning style assessment as a platform for both teachers in their planning, and teaching students' lifelong learning.

An important question to ask in this context is the intention of learning: is it to achieve the profession or to expand lifelong learning strategies? Are the differences between the two groups due to the selection of their future profession? Is it about constructs about their beliefs and learning, or is it that certain professions attract people with certain learning styles preferences, e.g. the kinesthetic preference? More research is needed in this regard.

6.6 Continued Research

The continuing research on this theme is to collect more empirical data, both qualitative and quantitative approaches, regarding these two groups of students. It is also to broaden the study to include other student groups that are relevant. Since teaching students and nursing students do have different needs for course designs, there is a need for randomized controlled experimental studies to explicitly make students aware of their approaches to learning and to support the development of their study practices. It is time to lay the table with several teaching and learning methods, and use didactics that suit most students.

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Note 1. Hereafter mentioned Dunns´ Model

Appendix 1

Productivity Environmental Preference Survey

Individual Profile

Name: **Sex:** Female **Date of Printing:** 2010-05-02

Year of Birth: <<< **Identification:** TY

Preference Summary

Scale	Score	20	30	40	50	60	70	80
1	50		Prefers Quiet		NOISE LEVEL		Prefers Sound	
2	46		Prefers Dim		LIGHT		Prefers Bright	
3	43		Prefers Cool		TEMPERATURE		Prefers Warm	
4	43		Prefers Informal		DESIGN		Prefers Formal	
5	31		Low		MOTIVATION		High	
6	50		Low		PERSISTENT		High	
7	44		Low		RESPONSIBLE(CONFORMING)		High	
8	57		Does Not Like		STRUCTURE		High	
9	72		Prefers Alone		ALONE/PEERS		Prefers With Peers	
10	50		Does Not Want Present		AUTHORITY FIGURES		Wants Present	
11	30		Does Not Learn In		SEVERAL WAYS		Prefers Variety	
12	67		Does Not Prefer		AUDITORY		Prefers	
13	38		Does Not Prefer		VISUAL		Prefers	
14	35		Does Not Prefer		TACTILE		Prefers	
15	50		Does Not Prefer		KINESTHETIC		Prefers	
16	45		Does Not Prefer		INTAKE		Prefers	
17	55		Prefers Evening		TIME OF DAY		Prefers Morning	
18	55		Does Not Prefer		LATE MORNING		Prefers	
19	53		Does Not Prefer		AFTERNOON		Prefers	
20	51		Does Not Prefer		NEEDS MOBILITY		Prefers	