

How Do Students in Vocational Programs Learn? A Study of Similarities and Differences in Learning Strategies

Lena Boström 

Abstract: Vocational programs are facing educational challenges. Many students leave secondary school in Sweden without graduating, and this is problematic in terms of equivalence, skill segregation, and lifelong learning for the students. This study has tried to see learning through students' eyes, and it has examined learning strategies in six different vocational programs. The research questions have addressed which general learning strategies dominate and which differentiate. The study involved 244 students. The Productivity Environmental Preference Survey (PEPS) learning styles assessment was used to identify 20 different student traits. Sex groups were compared with descriptive statistics and analyzed by using the F-test and analysis of variance (ANOVA). The tendencies were low motivation, conformity, a high need for structure and routine, multimodal dominance, and a need for intake and movements. The most productive time of day was in the afternoon. The statistical analysis revealed that six of the 20 elements differed, but there were more similarities than differences. This study highlights the importance of finding a pedagogical model that is suitable for vocational education, expanded educational strategies, and in-depth didactic discussions. The results are valuable for people involved in the planning of vocational education and for the students themselves.

Keywords: differences, learning styles, pedagogical implications, similarities, vocational education

1. Introduction

1.1 Background

The new upper secondary school in Sweden (LGY 11) is divided into the college preparatory program and vocational programs. Just over half (51%) of first year is dedicated to pre-university programs, one third (31%) is dedicated to vocational programs, and nearly one fifth (18%) is dedicated to one of the five introductory programs. Although the new reform reduced foundation subjects for vocational programs, all students learn new, very advanced subject matter for 3 years, from foundation subjects to theory in vocational subjects. A large number of students fail despite the government's objectives for the vast majority to graduate. Almost all students (99%) begin upper secondary education after compulsory school. Every third student leaves school without graduating. An incomplete education in

foundation subjects occurs to a greater degree in vocational programs compared to pre-university programs (National Agency for Education, 2012b). Added to this is so-called "secondary shock" meaning that one in every 20 students starts over, presumably because the content of the program did not meet expectations, the student did not fit into the class, or the student could not master the studies (National Agency for Education, 2012c).

The situation is taken seriously by the authorities (National Agency for Education, 2010; National Inspectorate, 2010) because of the fact that too many are unauthorized for upper secondary and higher studies, which leads to a deterioration of equivalence (National Agency for Education, 2012a). Additionally, problems with inadequate basic skills are "shifting up" in the



Lena Boström (Correspondence)

lena.bostrom@miun.se

educational system. Criticism of the school system is based on the fact that schools are not adapting enough to individualized learning and there is a need to improve conditions in order for students to achieve their learning outcomes and objectives. One reason that is discernible behind the inability to graduate is unproductive relationships between students and teachers.

Another issue is schools' inability to be flexible regarding different ways of working. They do not take sufficient account of students' specific circumstances and needs (National Agency for Education, 2001; Hugo, 2006). Another reason cited is that many students do not feel that the schools' content is meaningful or appropriate for them (Hugo, 2006). Furthermore, schools are criticized for putting too little time into core activities and for the fact that teachers are not taking enough responsibility for students and helping them with their learning needs. Only one third of the teachers' time, 32%, is devoted to students and their learning (Fölster, Morin, & Renstig, 2009).

In upper secondary schools, there are more requirements now compared to earlier. Many students find it difficult to establish good study skills and appropriate learning strategies (Mörtsell, 2007). Teachers in upper secondary schools strive to the best of their abilities to implement the best educational programming and constructive teaching (Fransson & Moberg, 2001; Lantz, 2007). However, many students feel that teachers do not do enough to help students establish learning strategies. Teachers, on the other hand, often experience frustration and inadequacy (Boström, 2004). To individualize instructions adequately and improve the environment so that all students may achieve good learning outcomes and goals, a first step could be to understand the diversity of student groups and individuals in order to meet their different needs and take advantage of their strengths. To do this, one must see teaching through students' eyes (Hattie, 2012). Because the above-mentioned areas of concern are more evident in vocational programs compared to pre-university

programs this study focuses of vocational programs. Important questions to address include whether students in vocational programs have general or distinctive learning strategies. This probably has repercussions for the teaching of vocational and foundation subjects and students' development of meta-learning.

This study has aimed to determine how the students at six vocational programs acquired distinctive and general types of learning strategies. After presenting a theoretical background on learning styles and related research, the empirical and methodological findings are presented. They are based on quantitative data from six vocational programs with descriptive statistics and significance testing of 20 different learning style traits. The article's concluding section discusses the results and the pedagogical and practical implications.

1.2 What Are Learning Styles and Learning Strategies?

The concept of learning style may include more than 70 different models with conflicting assumptions about learning and with different designs and starting points (Coffield, Ecclestone, Hall, & Moseley, 2004). There are many different theories and models on learning styles with varying dimensions and variables. They focus on different aspects of cognitive processes, skills, sensory modalities, the process of learning, and thinking styles. Theories on learning styles assume that anyone can learn, albeit in different ways and on different levels. The area is comprehensive and addresses both individual and group levels, but it also affects the entire educational organization in different ways, such as how the theory can be applied in schools with parents, students, and staff in collaboration (Riding & Rayner, 1998).

In Scandinavia, the two most well-known and used models are Kolb's model, which describes information processing and is frequently used as a starting point in problem-based learning (Hard af Segerstad, Klasson, & Tebelius, 1996), and Dunn's model, which is

multidimensional and is used extensively in compulsory and secondary school and in adult education (Boström & Lassen, 2006; Lauridsen, 2007). The concepts about learning styles often overlap with concepts about learning strategies. Identifying a universal definition of learning strategies is not easy. However, in many contexts, it emphasizes the importance of students developing their own learning, so they become autonomous, gain awareness, and acquire valuable tools for lifelong learning. The PISA report (OECD, 2010) emphasized that students with a well-developed ability to self-manage their learning can choose appropriate learning goals and use their prior knowledge and skills to focus on and select usable strategies for different tasks. The following can be found in the report: “Good learners can apply an arsenal of learning strategies in a flexible manner (p. 77). The report also emphasized that in order to master learning strategies, it is critical to include reading. Swedish adolescents are well below the average of OECD countries in terms of learning

strategies. This study has examined conscious or unconscious choices of learning strategies based on the learning style that various students have (cf. Boström & Kroksmark, 2005).

1.3 Dunn's Learning Styles Model

Dunn's learning styles model is probably the most internationally diverse, researched, and practiced learning styles theory (Buli-Holmgren, Guldahl, & Jensen, 2007; Lauridsen, 2007). It focuses on what determines how we acquire complex, new knowledge. Learning style preferences are a combination of both biological and learned patterns, which means that identical instruction, environments, and materials are effective for some individuals but ineffective for others (Thies, 1999-2000). Most people have learning style preferences, but individual preferences differ significantly. Learning styles varies generally in different populations depending on academic achievement, gender, age, culture, and brain processing.



Fifty years of research has shown that there are twenty different factors (also called elements) that have objective and measurable impact on learning. These twenty factors (see Figure 1) has been in international research has shown a statistically predictable significance at the 95% level.

Figure 1. Dunn's' learning styles model in a Scandinavian design

The elements are divided into five different areas (stimuli): environmental, emotional, sociological, physiological and psychological elements, which in varying degrees affect every individual. At the

individual level, it is of utmost importance to be aware of what affects motivation, concentration and retention, and then be able to match this. This leaning style model is directly applicable to direct learning situations and should not be confused with psychological models and tests. It is not as aptitude, personality types or attitudes, but focuses on learning of what is perceived as difficult and new.

1.4 Previous research

To date there are approximately 900 scientific studies on Dunns' model. Research on the model and its use is spread over about 130 universities worldwide (Dunn & Griggs, 2007). It has been researched from many different aspects: as different school types, ages, subjects and populations. Many studies have focused on whether learning styles pedagogy has impact on participants' performance, retention, attitudes and behaviors. Others have focused on meta-learning and school improvement.

1.4.1 Learning styles research and students in vocational education

There is a need for knowledge of vocational students learning strategies in a broad international perspective (Briggs, 2000; Brown, 1998; Slaats, Lodewijks, & van der Sanden, 1999; Stavenga de Jong, Wierstra, & Hermanussen, 2006; Smith & Dalton, 2005a, 2005b; Woods, 2012). The need for knowledge is based on many factors. In an increasingly complex reality involving rapidly changing working environments that will greet students upon matriculation, in order for students to be able to participate in them successfully, they must master meta-learning and be able to absorb more advanced levels of theoretical knowledge during training. Apprenticeships are one special type of vocational program. The need to understand learning style preferences in the construction industry in the United States is described by Woods (2012). It is essential to improve students' positions in future labor markets and to promote apprenticeships. According to Standridge, many schools in the U.S. are not preparing

students with the updated skills required for competition in the global economy (2010). She has examined adult students at a vocational technical training facility and compared the students' learning styles and their perceptions of them, as well as teaching strategies. The main result was that the students felt that their personal insights into the strategies were a good foundation for their studies.

Lifelong learning is a basic argument for paying attention to learning styles in training. An extensive study from Australia (Smith & Dalton, 2005 a, 2005b) states that it is important for teachers to take into account the needs of students' learning styles when designing training programs, giving instructions, coaching, and developing methodology. Generally, teachers do not have enough knowledge and understanding of learning styles to allow the methodology to permeate the educational act. Vocational teachers realize the need for students to master self-directed learning, but according to the students, teachers do not seem to be sufficiently equipped to provide students with the strategies.

Researchers believe that there are many advantages to developing the learning styles concept in vocational training, one being that they support students in changing their "mindset" and developing meta-cognitive abilities. However, according to Smith & Dalton, this requires that teachers expose students to different instructions and strategies and that they learn to observe and discuss students' preferences. The great benefit of applying learning styles in vocational training is that students develop meta-learning, as demonstrated by Briggs (2005) in a survey of 18 vocational courses in six vocational schools. This aspect of learning styles was also researched by Hattie (2009).

The differences between four different types of vocational training, including trade, health, agriculture, and technical education, are described by Slaats'

Lodewijks and van der Sanden (1999). They found that trade students were more reproductive, technical students were more constructive, health students were more versatile, and agriculture students were passive regarding learning styles. They wondered whether the differences could be explained by referencing the differences in various vocational specializations or students' habitual ways of studying, or if whether the differences were the result of learning contexts that students are confronted with.

Internationally, there are a dozen studies on Dunn's model and vocational training in allied health (Lefkowitz, 2007; Hamlin, 2007), economic education (Mangino & Griggs, 2007), and technical training (Ingham, 2007). These studies cover different topics by analyzing methodical matching and impacts on performance, memory retention, meta-cognition, and attitudes.

In Scandinavia, a dissertation was written on teaching grammar to students in upper secondary school (Bostrom, 2004). Students at both vocational and pre-university programs participated in an experimental study. Learning styles teaching was compared to traditional teaching, and the results revealed statistically significant differences in achievement, attitudes, evaluations, and an understanding of the usefulness of grammar. Furthermore, two studies compared high school teachers and students' learning style preferences, one in Sweden (Boström, 2011b) and one in Denmark (Boström, 2011a). These indicated significant differences between teachers and students but not between the student groups. However, some distinctive features were revealed in the different vocational programs in Denmark. One conclusion was that it is important for teachers to reflect on their own learning style and its repercussions on teaching style and quality in education. Another conclusion was that teachers must examine different ways of learning in vocational

education in order to adequately meet the needs of the groups.

2. Method

2.1 Purpose

There is a knowledge gap regarding students in various vocational programs. Learning strategy skills are important in terms of the quality of interactions in teaching and learning. Knowledge and the use of learning strategies have repercussions on teachers' ability to convey knowledge and skills and on students' meta-cognitive development. The purpose of this study has been twofold: to describe general trends in how students learn at six different vocational programs, and to compare learning styles at a group level. The study has aimed to answer the following research questions:

Q1. How do students at six different vocational programs learn? What general learning strategies dominate?

Q2. Are there are significant differences between the six vocational programs?

2.2 Population

To fulfill the purpose and answer the research questions, a quantitative analysis of students' learning style profiles was conducted. The study included 244 students from six different vocational programs in four different upper secondary schools. The vocational programs that participated in the study were Children and Recreation (bf), Building and Construction (By); Electricity and Energy program (El), Vehicle and Transport program (Fo), Natural Resource Use (Nb), and Restaurant Management and Food (Rl). There were 62 women and 182 men in the study (see Table 1). Data was collected during the years of 2009 to 2012. This measurement is based on a group selection. Only questionnaires with complete responses were discussed. Eight questionnaires (3%) were partial questionnaires and were therefore lost.

Tabel 1 Information on the population in terms of gender and admissions scores

Programs		Bf	By	El	Fo	Nb	Rl
Gender	Female	32	13	9	3	5	20
	Male	9	54	27	29	33	10
Lowest Admission scores		100	140	120	140	115	125
			-195*				
Total		41	67	36	32	38	30

* Three different orientations of the program gave different admission scores

2.3 Instruments for Data Collection

The students were tested with the assessment Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn & Price, 1984, 1991, 2000; Price, 2001). The test questions focused on what is important when learning difficult, new knowledge. The test consisted of 100 claims in five gradations, from 1 (definitely disagree) to 5 (definitely agree). The PEPS test is a useful tool for drawing conclusions about students' learning styles (Dunn et al., 1995; Nelson, et al., 1993). Response data were processed to obtain an individual mean of the 20 learning style elements. The individual profiles produced an average value for each question in the areas of low (mean 20–40), flexible (mean 40–60), and high (mean 60–80). The mean values of every individual element were then used to generate a group average. These formed the basis for the analysis in the study.

2.4 Methods: Descriptive Statistics and Significance Testing

This study employed a quantitative approach, descriptive statistics, and an analysis of variance (ANOVA), which is an analysis of variance between groups compared with the averages within groups. Thus, the conclusions drawn about the existence of significant differences may make it possible to draw conclusions about the corresponding differences in the population.

The strength of this study was that the results were produced by well-tested instruments 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 should be viewed as “snapshots.” Learning styles may change over time (Dunn & Griggs, 2007). More in-depth research requires repeated measurements. The study is limited to six classes from different vocational programs from four different schools. The results of this investigation will apply primarily to the populations surveyed. Given the number of students in each class, this is sufficient for the selected design (Creswell, 1994; Hassmén & Koivula, 1996). One weakness is that the study design is based on only one method. A multiple-choice method would have strengthened the study's results. Triangulated, quantitative and qualitative studies are needed. The intention was to conduct a pilot study that could be the basis for further research.

2.5 Ethical Considerations

Ethical decisions arose throughout the research process. The Research Council's ethical norms were followed in the study and this entailed protection of the individual with regard to information, consent, confidentiality, and use. School leaders, students, and teachers were asked about the study, and information was given about its purpose, procedure, and possible uses in the research

literature. All participated voluntarily in the study after a presentation on it and an assurance of anonymity. Each individual was guaranteed anonymity by each student, and each school class was given codings. The survey results were therefore not linked to the individual. The only information that has appeared in the study concerns which specialization was provided.

3. Results

First, an overview of the descriptive statistics and results is provided, and then, the significance testing for the distinguishing profiles of the vocational programs is presented.

3.1 Descriptive Results

The percentage distribution for each learning style

preference is shown in Figures 2a and 2b. The twenty factors are presented in the ranges of <40 (= low preference), 40–60 (= flexible preference) and > 60 (= high preference). The majority of students' preferences were in the range of 40–60, which indicates flexibility. Dunn and Grigg (2007) argued apropos of flexibility that as long as the students are interested in the content, they learn, but when they are not interested, they learn superficially, and only in short-term memory. Table 1 thus shows the percentage split under 40 and over 60 for every element. Markings in these fields indicate students' strengths and needs, i.e., what is important in order for them to learn effectively.

Figure 2a. Percentage Distribution of Learning Styles Preferences

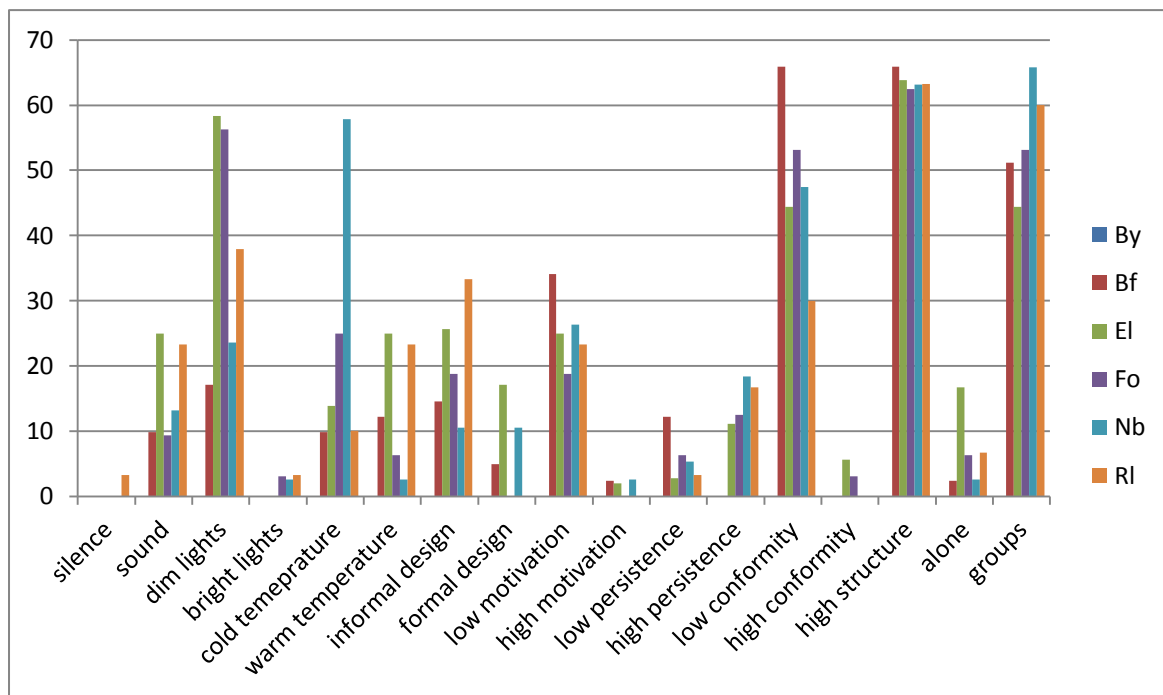
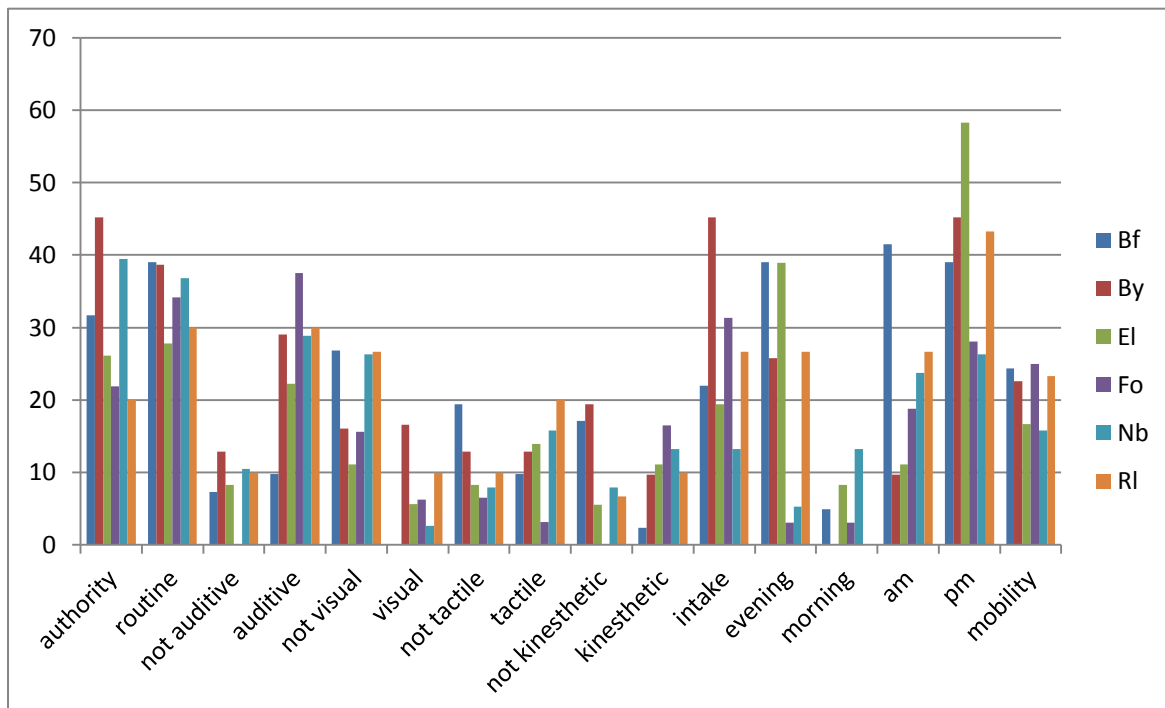


Figure 2b. Percentage Distribution of Learning Styles Preferences (continued)



3.2 Specific Learning Styles and Similarities between Vocational Programs

A look at the group level in Figures 2a and 2b shows some general similarities: students do not learn in silence, they do not prefer strong lighting, approximately 25% of students have low motivation, and almost no one has high motivation. Many students have low conformity and almost none have high conformity, the need for structure is very high (52-66%), many want to work in a group, at least a quarter of the students prefer working based on routines, their need for intake is fairly high, afternoon is the best time rather than morning, and they have a fairly strong need for mobility. When it comes to perceptual preferences, these are not so strong. However, many of the students are flexible, as can be seen from Appendix 1. This indicates

that they can learn through different senses if they are interested (Dunn & Griggs, 2007).

3.3 Statistical Differences between Groups

Analyses of variance (ANOVA) combined with pair wise comparisons were used to detect any differences. For multiple comparisons, the Scheffe post hoc test with a selected level of significance of $p < 0.05$ was used. The analyses of the data included mean values, standard deviations, and significant F values (see Table 2). Table 2. Students' Learning Styles Preferences: Mean, Standard Deviation, and Significant F Value

Table 2 Students' Learning Styles Preferences: Mean, Standard Deviation, and Significant F Value

Element	Bf (n= 41)		By (n=67)		El n = 36)		Fo (n=32)		HR (n = 30)		Nb (n = 38)		F value
	M	SD	M	SD	M	SD	M	SD	M	SD	SD		
Light	1.8	.381	1.82	0.386	1.42	0.500	1.47	0.567	1.67	0.547	1.75	0.490	5.886 **
Temperature	2.02	0.474	1.99	0.476	2.11	0.622	1.81	0.535	2.13	0.571	2.00	.465	8.68 ***
Persistence	2.88	0.331	2.18	0.424	2.08	0.368	2.06	0.435	2.13	0.434	2.13	.475	2.947 *
Conformity	1.34	0.480	1.76	0.580	1.61	0.599	1.50	0.568	1.70	0.466	1.53	.506	3.610 **
Intake	2.22	0.419	2.24	0.495	2.06	0.583	2.28	0.523	2.27	0.450	2.00	.520	2.113 **
Morning	1.66	0.575	1.81	0.435	1.69	0.624	2.00	0.254	1.73	0.450	2.08	.428	4.813**
Afternoon	2.15	0.823	1.97	0.627	1.64	0.683	2.13	0.492	2.00	0.743	2.05	.655	2.714 **

Pair wise comparisons revealed the following statistically significant results:

- The need for light is statistically distinguished; By students need more light compared to both El and Fo students, and Bf students need more light compared to El and Fo students.
- Nb- students prefer lower temperatures in rooms compared to four other groups of students: El, Rl, Bf, and By students.
- By students are more persistent and conformist compared to Bf students.
- Nb students are more morning alert compared to Bf students.

In conclusion, there are both differences and similarities between the six different vocational programs. There are statistical differences for six of the 20 preferences. The similarities, however, are more apparent than the differences.

4. Discussion

4.1 Overall findings

The focus of this study was to learn more about how students at six different vocational programs learned (Bf, By, Fo, El, Nb, and Rl); what learning strategies dominated, and what the similarities and differences were between the programs. The PEPS learning styles assessment was used to determine students' learning style preferences. The descriptive statistics illustrate some general trends and similarities between the groups. and the statistical analysis illustrates significant

differences for six of the twenty elements.

Pair wise comparisons showed the following statistically significant results:

- The need for light is statistically distinguished; By students need more light compared to both El and Fo students. and Bf students need more light than the El and Fo students.
- Nb students prefer lower temperatures in rooms compared to four other student groups: El. Rl. Bf. and By students.
- By students are more responsible and conformist compared to Bf students.
- Nb students are more morning alert compared to Bf students.

In conclusion, there are differences and similarities between the six different vocational programs; six of the 20 style elements. The similarities, however, are more apparent than the differences.

4.2 The Differences

Regarding the physical learning environment students seem to have distinctive lighting and temperature preferences. Nb students need cooler temperatures than students in four other programs. This may be because their activities are conducted in outdoor environments and with much physical work. The need for more light in By students compared to El and Bf students and compared with El- and Fo-students is a bit difficult to explain. By students having higher levels of

responsibility and being more conformist compared to Bf students may be partly due to higher admission scores (see Table 1) for the former and the fact that they might be educated in the traditions of the construction sector which requires both conformity and responsibility in order to implement work. Finally the Nb student preference for morning and early morning may be a result of their ongoing training and choice of career. Many of these students must get up early in the morning, for example, to care for animals.

In a review of international studies of different populations however differences between groups are larger than individual differences (Dunn & Griggs, 2007). Regarding this study's result it may be concluded that it is not possible to compare it with similar international ones because there are no such studies.

4.3 Essential Learning Strategies: What to Do?

This study has also revealed important trends in six vocational programs, which could have repercussions for educational planning.

a) The physical environment can be planned so the need for sound can be adjusted, but this should be done after conscious evaluations of learning: are noise preferences a habit. Inexperience, or is the sound a prerequisite for concentrating? If the latter is the case, it should be clear under what conditions noise is acceptable (concentrated work) and that it must not interfere with any other students. The need for more subdued lighting may be considered in teaching facilities. A flexible design in both formal and informal workplaces could be prepared. Temperatures can be adjusted so that the group that needs it has access to rooms that are, in the case Natural Resource Use students cooler.

b) Concerning emotional elements this study indicated that one in four students is not motivated to

learn in school settings. Very few have high motivation. One important question to ask concerns how theoretical topics can "trigger" motivation in students. The other side of the coin of motivation is that students should receive support to process and strengthen their motivation. This study shows that many of the students have low conformity, meaning that they speak up, provoke, and do not want to take responsibility. Could this be related to a low level of motivation? One way to manage these qualities is to improve teachers' leadership skills in order to meet each individual's needs and increase knowledge and understanding of students' forthcoming professions (cf. Briggs, 2005; Standridge, 2010). The high degree of students' structural needs also emerges clearly. The more difficult something is, the higher the need for structure appears to be. This is an important aspect for teachers to consider in the course, area, and lesson plans as well as in tutorial situations. Quite a few students also need routine in that they want to be safe in their work environment before they change and its changes them. This may be crucial to students' abilities to confidently consolidate their knowledge.

c) Sociological preferences at the group level for the six vocational programs indicate an unexpectedly large number of students who are group-oriented. (45–75%), which, compared to international studies is high: generally speaking, it is supposed to be 28% (Dunn & Griggs, 2007). This, also has implications for educational choices: group learning methods can be used more widely. The need for a teacher, or authority, is also clearly visible in the group profile, which means that teachers have a key role to play in students' learning.

d) The physical preferences are almost all are multi-sensory, but not with a strong preference for one sense. A pedagogical consequence of this is that teachers should broaden their methods and teaching strategies so as to transform the theoretical content of multimodal methods and approaches. There is also a clear preference for afternoon as the best time of day.

This could possibly be due to the generation that the students belong to and this generation's habits. What would happen if school times shifted to afternoons and evenings? Or should the educational system become clearer in its purpose of promoting vocations and then prepare students for a profession where one starts working early in the morning? Many students' need for intake and mobility can be attributed to their age and their career choices. They will have careers in which they will move much. However, there are factors to consider in school. Could one trial furnish them with stand-up desks in classrooms? Students in vocational programs have chosen this direction for an important purpose, namely, that they are probably more interested in practical work. They are not interested in theory in the first place, and may have negative experiences in school. Therefore, they have some clear needs that are indistinguishable in terms of such structure and routine, and they have low or moderate motivation and a tendency to have low conformity. The latter may be a sign that they are not happy in a school context. as in the theoretical subjects based on a traditional, academic structure.

The results can also be attributed to age, maturity, context, and surrounding structures in the community for different populations (cf. Staats' Lodewijks & van der Sanden. 2012). Some of the general learning strategies show how far from the adult, vocational world school life is carried out and what kind of different structures are created.

4.4 Educational Implications and Further Research

To meet students' diverse needs, insights in learning style preferences and a clearer focus on diversity in teaching, learning, and assessment in vocational programs are required (Briggs. 2005; Smith & Dalton. 2005; Boström. 2011a. 2011b). A broader methodological repertoire is needed for the teaching of academic subjects and curricula (Boström. 2004; Hamlin. 2007; Lefkowitz. 2007). Another important

conclusion that one can derive from this and other studies (e.g.. Boström. 2004b; Calissendorff. 2008) is that knowledge of human diversity affects learning at a deeper level, and is concurrent with the development of meta-cognitive skills. Students can better understand both their own learning and that of others. They can also more easily find individual study strategies and thus be more successful in their studies (Woods. 2012).

By using learning style profiles both with individuals and in groups, teachers can become aware of the differences between groups and between vocational programs. Then we have another opportunity to live up to the schools' vision of inclusion, individualization, and education for all. Stensmo (2008) summarized learning styles and leadership in the following words: "As the students have to find their best way of working and learning, teachers must find their best way to teach and lead in the classroom and other educational places" (p. 130). If different vocational programs appear to attract students with specific learning style preferences, teachers who offer academic subjects in these programs should be aware of it in order to build relationships with students. Students need to receive this kind of support of lifelong learning. Teachers who do not have relationships with students or knowledge of their learning strategies may not be able to offer good support for them in their learning process.

For everyone involved in vocational education. it is crucial to understand that if students are given the opportunity to learn through their strengths. they can also easily manage the weaker side of their style. One consequence of this is that students have the opportunity to become less dependent on authority and self-sufficient in build lifelong learning. When people are involved in the process of discovering how they learn. they can build on their strengths and preferences. Therefore, they can overcome obstacles to their learning and achievement, improve their behavior and attitudes, and develop motivation to engage in lifelong learning.

By extension, it is important to analyze whether vocational programs attract students because they have a dislike of school and traditional ways of teaching, concepts, and structures, which has consequences for the educational platform in which the vocational didactic is assumed and for recruitment to certain vocational programs.

A subject for further studies in this area could be to map to a greater extent various and multiple vocational programs over time. Other important aspects to consider in future studies are gender differences, different teaching styles, and the effects and consequences of different learning environments. The question that Staats' Lodewijks and van der Sanden. (2012) posed, that the style differences between vocational programs can be explained or predetermined because of different vocational specializations, remains to be answered.

References

Boström. L. (2004). *Lärande & metod. Lärstilsanpassad undervisning jämfört med traditionell undervisning i svensk grammatik*. (Dissertation). Jönköping: Högskolan för lärande & kommunikation i Jönköping & Helsingfors Universitet.

Boström. L. (2011a). Elevers lärtilar i jämförelse med deras lärares lärtilar. En jämförande studie av lärare och elever i ungdomsskolan i Danmark. *Pedagogisk psykologisk tidsskrift*. 47(5). 560–580.

Boström. L. (2011b). Students' learning styles compared with their teachers' learning styles in upper secondary school – a mismatched combination. *Education Inquiry*. 2(3). 475–495.

Boström. L.. & Kroksmark. T. (2005). Learning and strategies. *Journal of Research in Teacher Education*. 4. 39–51.

Boström. L.. & Lassen. L. M. (2006). Unraveling learning. learning styles. learning strategies and meta-cognition. *Education + Training*. 48(2). 178–189.

Briggs. A.R.J. (2000). Promoting learning style analysis among vocational students. *Education + Training*. 42(1). 16–24.

Brown. B. (1998). *Clearinghouse on adult careers, and vocational education*. Learning Styles and Vocational Education Practice. NY:

Eric

Buli-Holmgren. J.. Guldahl. T.. & Jensen. R. (2007). *Refleksjoner om opplæring - i et læringsstilsperspektiv*. Oslo: Cappelen Damm.

Calissendorff. M. (2008). *Det är viktigt att känna att man duger! Resultat från enkät- och intervjuundersökning om SMI-studenter och lärstilar*. Rapport. Stockholm; Stockholms Musikpedagogiska Institut.

Coffield. F.. Ecclestone. K.. Hall. E.. & Moseley. D. (2004). *Learning styles and pedagogy. A systematic and critical review*. Learning & Skills Research Centre. Retrieved from <http://www.lsrc.ac.uk>

Creswell. J. W. (1994). *Research designs. Qualitative & quantitative approaches*. London: Sage.

Dunn. R.. & Dunn. K. (1999). *The complete guide to the learning style inservice system*. Boston: Allyn & Bacon.

Dunn. R.. Dunn. K.. & Price. G. E. (1984. 1991. 2000). *Productivity environmental preference survey*. Lawrence. KS: Price System.

Dunn. R.. & Griggs. S. (2007). *Synthesis of the Dunn and Dunn Learning Style Model: Who. what. when. where. and so what?* NY: St. John's University. Center for the Study of Learning and Teaching Styles.

Dunn. R.. Griggs. S.. Olsson. J.. Gorman. B.. & Beasley. M. (1995). A meta analytic validation of the Dunn and Dunn Learning Styles Model. *Journal of Educational Research*. 88(6). 535–364.

Fölster. S.. Morin. A. & Renstig. M. (2009). *Den orättvisa skolan*. Stockholm: Hjalmarson & Högberg Bokförlag.

Fransson. G.. & Morberg. Å. (2001). *De första ljuva åren: Lärares första tid i yrket*. Lund: Studentlitteratur.

Hamlin. T. (2007). Impact of learning styles strategies on adults in human services. I. R. Dunn. & S. Griggs. (Eds). *Synthesis of the Dunn and Dunn Learning Style Model: Who. what. when. where. and so what?* NY: St. John's University. Center for the Study of Learning and Teaching Styles.

Hård af Segerstad. H.. Klasson U.. & Tebelius. U. (1996). *Vuxenpedagogik – att iscensätta vuxnas lärande*. Lund: Studentlitteratur.

Hassmén. P.. & Koivula. N. (1996). *Variansanalys*. Lund: Studentlitteratur.

Hattie. J. (2009). *Visible Learning. A synthesis of over 800 meta-analyses relating to achievement*. NY: Routledge.

- Hattie, J. (2012). *Visible learning for teachers*. New York & London: Routledge.
- Hugo, M. (2006). *Liv och lärande i gymnasieskolan: En studie om elevers och lärares erfarenheter i en liten grupp på gymnasieskolans individuella program*. (Doktorsavhandling). Jönköping: Högskolan för lärande och kommunikation.
- Ingham, J. (2007). Impact of learning styles on engineering students. I. R. Dunn. & S. Griggs. (Eds). *Synthesis of the Dunn and Dunn Learning Style model: Who. what. when. where. and so what?* NY: St. John's University. Center for the Study of Learning and Teaching Styles.
- LaMothe, J., Billings, D.M., Belcher, A., Cobb, K., Nice, A., & Richardson, V. (1991). Reliability and validity of the Productivity Environmental Preference Survey (PEPS). *Nurse Educator*. 16(4). 30–34.
- Lantz, J. (2007). *Bilder av fysik*. Reports from MSI (Report No. 07154). Växjö University:
- Lauridsen, O. (2007). *Fokus på läring: Om læringsstile i dagligdagen professionelt og privat*. København: Akademisk forlag.
- Lefkowitz, R. (2007). Impact of learning styles on allied health studies. I. R. Dunn. & S. Griggs. (Eds). *Synthesis of the Dunn and Dunn Learning Style Model: Who. what. when. where. and so what?* NY: St. John's University. Center for the Study of Learning and Teaching Styles.
- Mangino, C., & Griggs, S. (2007). Learning styles in higher education. I. R. Dunn. & S. Griggs. (Eds). *Synthesis of the Dunn and Dunn Learning Style Model: Who. what. when. where. and so what?* NY: St. John's University. Center for the Study of Learning and Teaching Styles.
- Mörtsell, E. (2007). Att börja i gymnasiet. En kvalitativ studie av elevers upplevelser av första tiden i gymnasieskolan. I *Forskande lärare i praktiken*. Vol.2. Jönköping: Högskolan för lärande och kommunikation.
- Nelson, B., Dunn, R., Griggs, S., Primavera, L., Fitzpatrick, M., Bacilius, Z., & Miller, R. (1993). Effects of learning style intervention on college students' retention and achievement. *Journal of College Student Development*. 34(5). 364–369.
- OECD (2010). PISA. 2009 Results. *Learning to learn. Students' engagement. strategies and practices*. Volume III. Retrieved from <http://www.oecd.org/edu/pisa/2009>
- Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies. Understanding style differences in learning and behavior*. London: David Fulton.
- Skolinspektionen. (2010). *Arbetar skolor systematiskt för att förbättra elevernas kunskapsutveckling?* Stockholm. Skolinspektionens rapport 2010:10.
- Skolverket. (2001). *Utan fullständiga betyg – varför når inte alla eleverna målen?* Retrieved from <http://www.skolverket.se/om-skolverket/publicerat>
- Skolverket. (2010). *Gymnasieskolan måste bli bättre på att stötta elever*. Pressmeddelande. 22 augusti 2010. Retrieved from http://www.skolverket.se/om-skolverket/publicerat/arkiv_pressmeddelanden/2010
- Skolverket. (2012a). *Allvarlig försämring av likvärdigheten i den svenska skolan*. Debattartikel. Retrieved from <http://www.skolverket.se/om-skolverket/publicerat/debattartiklar/allvarlig-forsamring-av-likvardigheten-i-den-svenska-skolan-1.174465>
- Skolverket. (2012b). *Betyg och studieresultat i gymnasieskolan läsåret 2011/12*. Retrieved from <http://www.skolverket.se/statistik-och-analys/statistik/2.4391/2.4395/betyg-och-studieresultat-i-gymnasieskolan-lasar-2011-12-1.187928>
- Skolverket. (2012c) *Börja om på nytt program i gymnasieskolan. Statistik och elevröster*. Rapport 376.2012. Retrieved from <http://www.skolverket.se/om-skolverket/publicerat>
- Slaats, A., Lodewijks H., & Van der Sanden, J. (2012). Learning styles in secondary vocational education: Disciplinary differences. *Learning and Instruction*. 9(5). 475–492. Retrieved from [http://dx.doi.org/10.1016/S0959-4752\(99\)00007-9](http://dx.doi.org/10.1016/S0959-4752(99)00007-9)
- Smith, P., & Dalton J. (2005a). Accommodation learning styles: Relevance and good practice in vocational education and training. Support documents. Training Research and Evaluation Program Report. NCVER. Retrieved from <http://www.ncver.edu.au>
- Smith, P., & Dalton J. (2005b). Getting to grips with learning styles. A National Vocational Education and Training Research and Evaluation Program Report. NCVER . Retrieved from <http://www.ncver.edu.au>
- Standridge, G. (2010). *Learning style preferences of adult students enrolled in career technical education programs*. (Dissertation). Alliant International University. San Diego **University**.
- Stavenga de Jong, J., Wierstra, R., & Hermanussen, J. (2006). An

exploration of the relationship between academic and experiential learning approaches in vocational education. *British Journal of Educational Psychology*. 76(1). 155--169.

Stensmo. C. (2008). *Ledarskap i klassrummet. 2: a upplagan*. Lund: Studentlitteratur.

Thies. A. P. (1999–2000). The neuropsychology of learning styles. *National Forum for Applied Educational Research Journal*. 13(1) 50–62.

Wærness. J.-I., Lindvig. Y., Andresen. R. & Nissen-Lie. R. (2005). Kartlegging av vidaregående opplæring i Østfold 2004/5. *Oppfølging av differensieringsprosjektet*. F 2/2005.

Woods. J. (2012). An analysis of apprentices in the U.S. construction trades: An overview of their training and development with recommendations for policy makers. *Education & Training*. 54. 401–418.