

Learning Styles in Nordic Research: Theoretical Origins and Empirical Observations on Grammar and Music

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Abstract

The term Learning Styles has become widely recognised over the past two decades, and its application is extensive throughout Scandinavia in both schools and the business sector. There are increasing calls to culturally validate, contextualize, review and critically examine this pedagogical theory. This article reports, examines and compares the two existing dissertations in Scandinavia on Dunn's Learning Styles model. As the two theses are very different in character and approach, the research-related designs are also analyzed in the light of the achieved results. This article is based on an exploratory analysis and is reanalytical; in other words, the results are based on past research and our own analytical contributions. The findings in this article have emerged in the encounter between past research and our understanding of Learning Styles theory and its practical application, after a couple of years' distance from our basic research. With the help of a linguistic and discursive perspective, the distinction between the common approaches, qualitatively and quantitatively, can be minimized and an integrative approach to Learning Styles theory can be identified. Against this background there is a discussion on challenges and opportunities to using the Learning Styles theory in Scandinavia for development and review as well as in a cultural context. The findings in this article are that Dunn's Learning Styles model can be used practically and methodically in our school culture in relation to the individualization our governing documents stipulate. The model can furthermore be modified to incorporate in its definition both theoretical knowledge and practical skills that are difficult and new. A continuous review of the model, however, demands a broad, single methodological perspective.

Keywords: Dunn & Dunn, grammar, individualization, learning styles, , methodological, music,

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1. Introduction

Central to this article is the assumption that there exists individual learning styles² and learning styles characteristics, and that these can be observed and assessed, as well as the assumption that the knowledge about students' individual learning styles characteristics can influence the teaching and the students' own consciousness. The article presents and compares quantitative and qualitative data from two contrasting dissertations, from different fields of study and populations within the pedagogical field; *Learning & Methods Research Concerning the Effects of Learning- Style Responsive versus Traditional Approaches on Grammar Achievement*. (Bostrom, 2004) and *If you Don't Want to Play – it's Ever So Hard. A Study of a Group of Pre-school Children Learning the Violin* (Calissendorff, 2005). The purpose is to compare these two dissertations within the theoretical framework of learning styles and to analyze the differencing approaches the dissertations have adopted. A further intention is to analyze new findings on the learning styles theory emerging in a cultural context and a professionalized discussion.

The research was conducted in an upper secondary school environment in a mid-size urban location in the northern part of Sweden, as well as in a municipal music-school in a major city in Sweden. The empirical framework from the former environment consists of static analysis on 323 randomly selected students. The research consists of two independent variables (learning styles methodology compared to traditional teaching methods) and three dependant variables (methods, ages and learning styles characteristic). The research applied a quantitative design, but also included qualitative components such as interviews and surveys with open questions. The research was founded on methodical triangulation.

The latter dissertation has a qualitative approach and is founded on a group of six pre-school children (aged five years) who were going to start to play the violin together. The parents were present during the lessons. The focus was on the child's own perspective on their learning. The research was theory generating according to Grounded Theory (Glaser & Strauss, 1967), whereby the theory is gradually developed on the basis of the data that emerges. The children showed when learning that they concentrated, processed, received and

² Learning Style is in this article defined as “the way the individuals begin to **concentrate** (pay attention), **process** (analytic versus global), **internalize** (commit to memory) and **remember** (be able to bring back) new and difficult academic information (Dunn, 2003). The concept of Learning Styles in this research is applied in relation to either the theoretical framework of Learning Styles or the individual profiles, as in the students' Learning Styles preferences.

remembered new information in different ways. They had different learning styles. Environmental, emotional, physiological, social and psychological elements were observed to influence the learning style of every individual child in a differing degree. At least twelve different learning styles characteristics were observed in the research conducted.

The purpose of this article is to illustrate, discuss and analyze the learning styles theory in a broader methodological context. There is a distinct need for insights and understanding within the field due to the theoretical expansion of the learning styles theory, combined with the modest historical research base in Scandinavian universities. We have therefore chosen to conduct an explorative study to be able to go further into the research and better identify alternative future research areas and/or modifications. We compare different skills in the two dissertations through lingual and discursive analysis, and demonstrate some links between the social practical implications and the results in the dissertations.

The introduction provides a description of the Dunn & Dunn Learning Styles Theory and the governing documents in Sweden with their focus on individualization. We then continue by summarizing the two dissertations on grammar and music through analytical comparison of the methodological approaches, fields of study and draw conclusions on similarities, differences and possible points of intersection. Finally we discuss a modification of the Learning Styles theory and a didactic research approach.

2. Learning Styles – a pedagogical theory on individual learning

Each individual has a particular preference (in this context attributes or needs according to Dunn & Griggs, 2007) when it comes to the manner, time of day, venue etc. to learn new and difficult content. The combination of individual learning styles characteristics is called *Learning Style* and it is of importance in the education situation to find these preferences and adjust the learning methods accordingly. By taking into account that every student has their own individual learning style, it is of great importance for a teacher to understand in what way it is possible for the student to concentrate and remember better, as well as the teacher actively trying to match (meet) the students' natural way of processing information (Nelson, Dunn, Griggs, Primavera, Fitzpatrick, Bacilios & Miller, 1993).

There are different models to describe learning styles, but the Dunn & Dunn Learning Style Model is probably the most widespread around the world, with the most numerous empirical researches supporting the theory (De Bello, 1990). The model shows 20 different factors (the authors call them elements), which have an objective measurable importance for learning. According to Meta analysis, each one of the factors has a predictable statistic significance at the 95% level. This means that if a specific factor is important for a student and the student then has this factor met in their education, the student will consequently perform better with a 95% certainty. These factors are divided into five different areas/stimuli; environment, emotions, social factors, physical factors and psychological factors.

Dunn & Dunn (1993) describes learning styles as:

The way that every individual is affected by using (a) their immediate surroundings (noise, light, temperature and furniture); (b) emotional factors (motivation, persistence, responsibility / alignment and structure), (c) social factors (such as teaching alone, in pairs, in groups, as part of a team, with one leader or the variance), (d) physical factors (perceptual strengths [auditory, visual, tactile or kinesthetic preferences], intake, time of day, and movement) and (e) psychological factors (data processing [analytical or holistic] analytic or holistic thinking style as well as impulsive or reflective []) when they learn new and difficult material or skills (p 3 - 4).

According to Dunn and Dunn (1993), these 20 factors are not of individual importance for all people. The stronger a preference is, the more important it is for the student's need/stimuli to be satisfied. If the student receives instructions or methods matching to her/his individual learning style the certainty is high that he/she will perform better compared to a method which not coherent with her/his learning style.

2.1 Definition learning styles according to the Dunn & Dunn Learning Styles Model

This article focuses on learning styles that possess a direct connection to concrete teaching situations and the students' individual learning styles (not to mix with cognitive styles). Learning style, according to Dunn & Dunn (1999) is defined as how an individual concentrates, processes and internalizes new and difficult information.

That which is new and difficult is therefore completely dependent on the level of difficulty and prior knowledge. A pre-school child learning to play the violin can perceive drawing the bow on the right string as complicated, while a student in the hospitality- and restaurant program at upper secondary level can perceive learning about vitamins and their functions as

new and difficult theoretical information. The learning styles theory discussed above is hence in essence about how individuals learn new things in the best way and what their respective strengths and needs are.

Learning styles in the Dunn Model is therefore about the students' strengths and needs, concerning i.e. environment, social groupings and ways of thinking, to be able to process the information as effectively as possible. The theory provides us with explanations as to why no teaching method seems to fit everyone as well as matching methods and strategies on an individual basis. The latter can be described by the following:

Learning style is a biological and developmental set of personal characteristics that makes the identical instructions effective for some students and ineffective for others. (Dunn & Dunn, 1993, p.5)

The quotation above suggests that learning styles characteristics are genetically dependent as well as socially learned. This provides a solid ground for continuous work with students' individual styles in a process where even the less strong sides can be improved

3. The governing documents and individualization

In order to link the Learning Styles theory to the context of our culture and school system it is necessary to analyze the foundation in the relevant governing documents. The current Swedish national curriculum, Lpo/Lpf-94 and Lpfö-98, is distinguished by a view of knowledge and methodical variation, which has its origin in the individual. It is thereby important to define and specify the commonly seen slogans in Swedish school politics, *to learn to learn* and *individualization*, in order to be able to practically implement those. Two vital goals for the school for every student are to "...develop curiosity and a desire to learn...", "... develop their own way to learn..." (Skolverket, 1994, p.9).

A curriculum was developed for pre-schools in 1998 (Lpfö 98) where goals were set for the preschool to aim for "*every child to develop their curiosity and desire to learn as well as ability to play and learn and to strengthen the child's confidence in their own ability*" (Lpfö 98, p. 7, freely translated). In several of the stated aims for the pre-school there is an emphasis on *his/her ability*, i.e. an emphasis on the individuality of each child.

Instrumental education in Sweden is often offered through private enterprise, in municipality directed schools or by educational associations lacking a comprehensive curriculum (several of these have often developed their own detailed goals and curricula). Some of those goals involve the student acquiring knowledge in music and to develop his/her own ability and skills. There are also schools, which in their goal strategy state that the teaching shall be adjusted according to each individual student's situation and ability. It is also apparent that the music schools focus on the students' abilities.

Furthermore the curriculum emphasizes an ambition on the importance for the students to:

"...develop an insight about their own ways of learning and an ability to evaluate their own learning..." (Skolverket, p. 29, freely translated)

The curriculum lacks specific examples of the ways individual can learn. It can however be assumed that students have different strategies for learning and that these can be specified, obtained and made aware. The curriculum also suggests that the mission of the schools when it comes to the individual should aim for meta-cognitive skills.

3.1 The learning styles theory in Sweden – empirical results in teaching grammar

Do methods have any impact in the learning of grammar? Is there any relation between learning and method? Can teaching be individualized with its origin on the students' individual learning styles? The main objective with Bostrom's (2004) dissertation was to compare whether grammar education in secondary level education affected the students' performance, memory, attitudes, understanding of grammatical knowledge and evaluation with methodical base in their individual learning styles, compared to traditional teaching.

The methodical strategy carried out in the research was by applying a triangulation method; primarily with a quantitative approach but also with qualitative features. The qualitative approach included surveys and open questions in the answer alternatives. Several instruments were utilized in the gathering of data in the quantitative part of the research, such as the learning styles test PEPS and different attitude scales. Furthermore, grammar tests of different kinds were conducted both initially and throughout the research.

The sample consisted of students from five upper secondary-school classes and four adult education classes, each class comprising of at least thirty students. In total 323 students were included in the research. The classes were working in different combinations between traditional teaching and learning styles-based education. The study was carried out with a balanced design to be able to control the Hawthorne effect. Quantitative data was analyzed with a variance-based analysis and multivariate variance analysis. A covariance analysis was also included to obtain a statistically comparable starting position for each class and for each student.

A short summary of the results show statistical significant differences on the 1%-level regarding results, attitudes, evaluation of the moment and understanding of the need of grammar between traditional education and learning styles based education. Statistical significance on the 0, 1%-level was found regarding the degree of grammatical knowledge retention five weeks after course completion (see table 1).

Table 1 - Summary of the results of the control group compared with the experiment group in grammar education

| Groups (T & T vs. LS & LS) | Significance |
|---|---------------------|
| Results (Final exam) | $p \leq .01$ ** |
| Retention (Exam after five weeks) | $p \leq .001$ *** |
| Attitudes | $p \leq .01$ ** |
| Evaluation | $p \leq .01$ ** |
| Comprehension (for the benefit of grammar) | $p \leq .01$ ** |

** statistical significance on 1%-level

*** statistical significance on 0,1%-level

The quantitative research of Boström's dissertation can be described in the way that the experiment group performed better at the final exam as well as on the exam five weeks after, while having more positive attitudes during the learning process, evaluating the process and

material more positively and at the same time perceiving greater benefit of grammar skills than the control group.

The study included a factor analysis reporting significant results when occurring. It is statistically significant that differences between control and experimental group were due to teaching methods. What is evident is that the visual students appreciate both the learning style and the traditional teaching. In the case of the two populations in the experimental group, there are no statistical differences in the 5 -% level, except for retention. This in itself may on the other hand be interesting when the adult learners remembered better than young people with a learning style methodology basis.

The qualitative statement addresses the attitude of teachers, their attitudes and performance as well as students' experiences of different methods. The qualitative study is pointing in the same direction as the quantitative. Variation, the possibility of success for many students and that the methods are perceived as more fun are emphasized in learning styles methods. If the students' work were based on their learning styles the grammar benefits arguments were more on students' own reflections and less on the teacher's views.

Hopefully, this study provides an important contribution to the school's core issues, namely that there are specific methodological tools to adapt teaching to students' individual needs and circumstances. In this regard, the study revealed that Dunns' Learning Styles Model also is useful in the Swedish school system. Given that the school's governing documents provide for individualization, perhaps this work may inspire didactic method development in other subjects. Understanding of teaching methods, learning and learning styles seem to be able to provide both teachers and students with tools for their own lifelong learning.

4. The learning styles theory in Sweden – empirical results in instrumental teaching

There is only one existing research in Sweden about the learning styles of students in instrumental education (Calissendorff, 2005). The study focused on a group of six pre-school children (aged five) that were going to begin to play violin in a group where the parents were present during the lessons. All the lessons and concerts during the first year of learning were observed. The children, parents and teacher were interviewed three times. The method used

was that of Grounded Theory (Glaser & Strauss, 1967), which means that the research initially was not influenced by any specific theories. Interesting “leads” emerging from the observations and the interviews was followed up in subsequent observations, interviews and chats. A “lead” can be explained as an interesting event, statement or observation (compare Blumer, 1969).

When a certain pattern can be found from the leads the data is assembled among the observed patterns and categorized. The next phase is axial coding which aims to find and clarify relation between different categories. Finally, a selective coding is made where the core category emerges and focus is set on what the theory aims to explain (Strauss & Corbin, 1998).

The leads followed up and giving rise to categorisation after two terms are the following: *easy and fun*, *tiredness*, *the group*, *hear or see (including knowing)*, *playing-time* and *parents and teacher*. After this categorisation a selective coding was performed, leading to the following development of the categories:

- *Easy and fun* became the category **motivation**. *Tiredness*, which was so often spoken of, became a sub-category of this.
- **The Group** remained a category
- *Hear or see* became the category **perception**, thereby including ‘feel’, which chiefly concerns the tactile and the kinesthetic mode but can also have to do with the aural and the visual. The ‘lead’ ‘know’ was linked with cognition and had to be followed up further since it could not be included within perception.
- *Playing-time* has been used in connection with the distribution of lesson-time. Since, however, the temporal aspect was much broader and included more than measurable time, playing-time became a sub-category of the new category **time**.
- *Parents and teachers* formed the category **adults**

During the last interview the teacher mentions that the children learn in different ways, whereby the analysis leads to learning styles. The teacher gives examples that some children “just listen” on which string to play and that the name of it is of no importance. Other children are described by the teacher to know that “*it shall feel just about this way as in the*

arm in this song. Others know for sure that it should be played twice on the string and the following sound doesn't really matter" (freely translated). The statements of the teachers display different ways of processing information into action: auditory, tactile, kinaesthetic and cognitive. Adults seem to perceive learning as personal and something that varies for each individual. Hence it can be concluded that each child has its own personal learning style.

4.1 The developing of the core category

The Dunn & Dunn Learning Styles Model is a source of inspiration for founding the core category, which are summarized as the following:

Design: Children want conformity. They prefer sitting down when playing, even laying down in some cases.

Motivation: The motivation is a theme throughout the research and is considered as of vital importance, by the adults, for the children to be able to learn.

Structure: The lessons are structured and structure is also present when practicing at home. It is difficult to know whether the children want structure or not. They say on the one hand they want to play that which is fun and easy, which suggests that they do not follow the set procedure. On the other hand, the parents state that when practicing the children just play through what has been taught at the lesson, and preferably in the same order. This suggests that some children want structure and for others it is not as important.

Persistence: persistence is linked to motivation, but children in the study demonstrate persistence while for example leaning against the edge of the seat to be able to continue to play. Children who simply stop playing when they get tired show, in turn, a lower degree of persistence.

Group: The group is not expected by adults to have a greater social impact on children. Nor do the children themselves express that the group would have social significance, but they can watch the other children in the group to verify that they play correctly. The group can thus be assumed to have significance for the children, but at this stage it is often unconscious.

Adults: Parents and teachers attributed great importance to the children, but also to the adults.

Intake: It is the adults who complain that children should not be hungry when they are going to play or practice, which has to do with energy level.

Perception: Perception appears to be of great importance where *hear or see* was the first thing that became clear.

Mobility: The children would not stand still for long and some have more needs than others to move.

Time: Time of day plays a significant role. Parents believe that certain times work better for the children to play at. Time must also "fit" i.e. parents must be available and there may not be a children's TV-program distracting them more than to play. There is a strong correlation between time and tiredness, i.e. motivation.

Processing: A mother describes how her daughter wants to know how many times she'll play on a string. The daughter is analytic and thinks a lot about how she should proceed.

Thinking style: In the study there are children who are very impulsive in their thinking style. They respond and imitate directly. Others are more reflective and not always have time to answer or get up the violin fast enough.

5. A comparison analysis of the two dissertations

That two seemingly very different theses in terms of design, methodological approach, epistemology, ontology, populations and philosophical foundation, have the Dunn & Dunn Learning Style Model as basic or result is worth an analysis. The following table is an attempt to summarize and highlight the different research approaches;

Table 2. Summary comparison of the two theses

| | Learning & Method | If you don't want to ... |
|------------------------------------|-------------------------------------|------------------------------------|
| <i>The primary thought process</i> | Deductive | Inductive |
| <i>Philosophical principles</i> | True principles | Subjective reality |
| <i>Ontology</i> | Reality can be measured | Reality can be experienced |
| <i>Epistemology</i> | An objective reality | Multiple realities |
| Purposes | Examination of theory, explanation, | Theoretical developmen, reveal the |

| | | |
|----------------------------|---|--|
| | prediction | complexity of uncovering meaning in human experience |
| <i>Design</i> | Experimental | Grounded Theory |
| <i>Population</i> | 323 upper secondary school students (adults & youth), randomly selected | 6 pre-school children |
| <i>Methodical approach</i> | hypothesis testing, significance testing | observations, interviews, categorization |

At a first glance at the two designs they are diametrically different. Bostrom's (2004) thesis tests the pedagogical learning style theory, while Calissendorff (2005) looks for a theory to describe children's learning in terms of playing the violin. The latter will find twelve of the 20 factors outlined in Dunn's model precisely while Bostrom tests only one (the perceptual) of the 20 factors in the model. Bostrom assumes the learning styles theory and Calissendorff arrives at it.

Calissendorff studied children's learning in real life, and found varying leads that led to categories and finally a theory. Bostrom was based on a theory and tested various hypotheses for assessing if learning styles could work also in the Swedish school culture.

The philosophical principles that the theses are based on are very different, as are the ontological and epistemological starting points. Are there any common denominators between the theses? The major similarity is that both theses are at the top of the respective designs continuum (De Poy & Gitlin 1999), i.e. the two studies have a high degree of structure. The experimental method is deemed to include the maximum degree of control, manipulation and control practised by the researcher within its paradigm and in the qualitative study's continuum Grounded Theory is considered as a maximum in terms of degree of structure that the researcher himself arranges, experience design and focus on design. Based on the categorization of the designer and the hierarchy along a continuum, we can comprehend the similarity in the results of our studies. Structuring principles, however, have a similar principle. In other words, the research strategies are different in the two studies, but one can still make comparisons and conclusions.

We believe that through a triangulation method, with help of the linguistic and discursive analysis, we can discern new approaches in the field. Neither strictly quantitatively based inferences nor qualitatively reflective approaches have been particularly successful in reaching generalization and validity of educational research, according to Fritzell (2009). That theory and practice are discussed in integrated perspective different types of

generalization can also be asked. We can see this analysis as "... a form of reconstructive application where different parties to call for the qualified claim that gradually orientates itself against the legitimate interests of all stakeholders (Fritzell. p. 191)". Due to the combined analysis, we can discern some relation.

6. Music and grammar - how similar is it? The language of music or musical language?

Even the choice of subject, music and grammar learning are worth analyzing. Can two such different subjects provide a broader understanding of research and point to a common denominator? Grammar learning was based on a theoretical framework; a school textbook, which is then transformed in four different ways. Music learning was at a practical level, using the instrument and skills.

We see similarities in the two subjects' language, structure, conceptual understanding and utilization. Music - especially learning notes requires reading comprehension and is structured grammatically. Note values are similar to maths and grammar, requiring a theoretical understanding of music as a conceptual whole. Music is similar to language. This is also the starting point of the mother-tongue method, or Suzuki method as commonly known (Suzuki, 1969). The child listens to speech before it learns to talk and then begin to read and write. In the mother-tongue method the children listen to music and then imitate what they heard and rehearse. Notes are presented only when the child can play and has a solid repertoire. It then has a mental picture of how the music sounds and how it should be played on the instrument, and therefore only need to learn to link the symbol of what it sees with its mental representation.

Grammar is learning first in practice and then learning the concepts and understanding of regulatory framework and structure. The more knowledge students have about language nuances, the better they can express themselves and use all its nuances.

Uggla (1964) points out, over 40 years ago, the value of working parallel with musical grammar and playing by ear in constant interaction in order to achieve real practical music knowledge. However there are few in later music educational research that makes connections to language research in grammar and how children develop their ability to read

unfamiliar melodies from the notes (Mills & McPherson, 2006). Focus has instead been, especially singing, in the promotion of language development, and especially in learning a new foreign language (See Antal Lundstrom, 2006; Jederlund, 2002; Ladberg, 2000).

There are continuous discussions among scientists on which methods and techniques are best for teaching children in reading. Many practicing teachers and researchers (Myrberg & Lange, 2005) point out that every child needs a mix of methods and techniques. They agree, however, that the ability to learn a language is best attained through speech, and after that basic structures and vocabulary has been established (Cooper, 2003). Mills and McPherson (2006) note that the most important principle, which is found in studies on language development, is that children become literate in the language orally before they start writing. In most countries children speak their language for five years before they start school and must learn to read. When learning an instrument the tactile and kinesthetic sense will also be of value and when sight reading to be aware of the sound/the music and also be able to bring together the auditory with the visual perception, which is especially important if the child is expected to develop a repertoire of musical patterns which are required to perform more complex passages.

The links between music and grammar appear to lie in the structural principles, partly in the need to utilize as many senses as possible. Then probably even the strongest mind should be the best to learn regarding difficult and new skills. Other strong learning styles preferences probably play an important role in learning outcomes.

7. The Learning Styles Theory under review

The research of learning styles is on the verge of qualifying into the group of pedagogical theory that is quickly adopted by teachers and professionals. This also means that it is critically reviewed by the modernistic pedagogical research tradition as well as by individual researchers with their own agendas. Prof. Kroksmark predicts that learning styles can be one of the *“practically applicable theories which every day practice in schools are looking for and what could be the foundation for the inquiring school system”* (freely translated, Kroksmark, 2005, p.44). Important criticism that has come through includes the view that it must be evident that the theory enables continuous evaluation and that students can develop

new learning styles characteristics throughout their learning process. The forthcoming article is hence to be seen as a reevaluation, or at least a modification, of the theory.

The analysis in this article points in two apparent directions:

- a) The learning styles model can fit into our school context, especially considering our governing policy documents and the strong emphasis of an individually suited school. The research shows specific methods of matching students with different learning styles characteristics. It also proves that at least twelve of the twenty characteristics can be observed on children.

- b) The definition of the learning styles characteristics, namely that they are activated when learning *new and difficult theoretical information*, is something we would like to reevaluate. Our belief is that the definition also can be applied for *new and difficult knowledge*. The learning styles characteristics would hence be able to be observed and utilized when learning practical skills.

A study of music teacher students learning styles profiles (Calissendorff, 2008), including PEPS-analysis and follow-up interviews, shows that the difference of the students' procedure of learning practical and theoretical information is exceedingly small. As far as possible the students used the same ways of learning and it was seen to be more the practical and psychological details that were seen as obstacles, e.g. not being able to learn to play piano whilst reclining on a couch. The group analysis of the surveys revealed that auditory was preferred by most students (28%). 25% of the students showed to have a low preference of learning visually, comparing to only 3% of the students had a strong preference of learning visually. Tactile and kinesthetic preference was shown by 30% of the students. The findings can be compared by the study conducted by Bostrom (2008) where the distribution of preferences was: auditory 21%, visual 3%, tactile 15%, kinesthetic 5% and mixed 56%. The 3-% visual preference corresponded in the two studies, as the percentage of auditory, which were between 20-30% in the both studies. Differences seen were that music teacher students didn't reveal any preference for varied learning, while most students in Bostrom's study preferred varied learning. An interesting continuing research for future studies would be to answer the questions: What learning preferences do students in other groups have? Are there any differences of learning styles preferences between students in practical and artistic classes and students in theoretical classes? Stensmo (2006) found that students in practical-artistic

classes showed significant differences from others regarding the kinesthetic learning preferences. By this finding the question arose how teachers could educate this (practical-artistic) group of students according to their best learning style. We can therefore pose yet another broader question; how is it possible to educate students and groups without learning how each individual learn in their best way?

8. Conclusions and discussion

The broad methodical approach and the discursive analysis have lead to a more indistinctive boundary between the two research basis and we can therefore argue for applying an integrated view on learning styles. By aiming for understanding a complex and humanly influenced reality in its different forms we try to make the learning styles characteristics visible and specified. The learning styles theory can therefore develop in our context. We have by applying an explorative approach consciously concentrated on investigating a research area to improve our own understanding about it. The approach applied in the study provides flexibility but cannot be generalized. The main objective in this case is to contribute to a greater understanding of learning styles theory in our culture and context.

It is of importance to implement theories into a context, which describes, investigates and concretizes to be able to better understand the dynamics of learning. If this can be complemented by other important, complex and dynamic elements, it would be possible to reveal a systematic classification of different levels of learning and their internal connections.

The dissertation *Lärande och metod* (Bostrom, 2004) showed positive links between different methods adjusted to students' individual learning styles and learning results. However two important and evolvable fields of study were pointed out: the tension between different concepts within the research of learning styles, as well as a further contextualization of those concepts.

The core category of the concept of learning style for Calissendorff's study includes five categories, which in itself has twelve sub-categories. This differs from the Dunn & Dunn Learning Style Model where the five categories are divided into twenty elements. The categorization concerns this presented research where inspiration to the theory formation

have been inspired by The Dunn & Dunn Learning Styles Model.

The Dunn research shows that the twenty elements have differing importance for different individuals learning. There is nothing in Calissendorff's study that proves whether children are sensitive to sound, light or temperature. However the furniture (design) has proven to have an impact. It is also seen as a difficulty in the study to determine whether the children in the study prefer to work alone, in pairs, in groups or as teams, since the education takes place in pre-determined groups. The children are of a young age and can have difficulties imagining the possibility of working alone or together with just one other child (as opposed to working in groups). The impact of those social factors might be revealed when they get older.

The substantial theory of the research has been inspired by the Dunn & Dunn Learning Styles Model. There is solid research behind the Dunn & Dunn Learning Styles Model, which to the greatest extent is based on quantitative research of adolescents and public education. Research based on qualitative interviews on how small children perceive and view their music learning can therefore contribute to a more in depth dimension of the model.

Furthermore, an interesting point by comparing those two dissertations is to obtain the possibility of developing the Dunn & Dunn Learning Styles Model. Different learning styles characteristics are without doubt present, which can be mapped out by analysis tools as well as by observations. The Grounded Theory cannot only be applied to map theoretical principles, but also to help modifying existing theories. The original definition of the Dunn & Dunn Learning Styles Model is that those characteristics apply when "*learning new and difficult information*". However, this research shows further possibilities of broadening the definition. Perhaps the definition can be extended to include new and difficult *skills*? We consider this as a way of strengthening the theory since the definition of ways to knowledge in our governing policies points on four main strategies: facts, familiarity, comprehension and ability.

In concluding we suggest a redefinition of the Dunn & Dunn Learning Styles Theory to include everything new and difficult, regardless of theoretical or practical knowledge. We encourage researchers and teachers to critically examine and study the theory further.

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