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**LEARNING AND STRATEGIES**

**Abstract**

The purpose of this article is to explore the field of learning, learning styles, meta-cognition, learning strategies and teaching by classifying different levels of the learning process. This is an attempt to identify how students' awareness of learning styles and teachers' matched instruction affect students' learning and motivation. It is based on a study which examined the effects of teaching Swedish grammar through traditional versus learning styles-based instructional methods. Academic achievement, retention, attitudes towards school and learning of the two groups were statistically compared. Data were analysed with regards to learning strategies and meta-cognition, self-efficacy, and empowerment.

Findings revealed that teaching based on individual learning styles appears to be an effective way to ensure students' achievement and motivation. Awareness of learning styles seemed to influence meta-cognition and choice of relevant learning strategies. Consciousness of their own improvement provided students with new perspectives of their learning potential.

A theoretical framework built on empirical research was identified by connecting and systemizing different parts of the learning process. Unraveling concepts, methods, and effects can aid students, teachers and researchers in understanding, evaluating, and monitoring learning, thus having practical implications for promoting life-long learning and self-efficacy.

*Keywords:* learning; learning style; meta-cognition; self-efficacy; teaching methods

**INTRODUCTION**

In a recently completed doctoral dissertation *Learning and method: Research concerning the effects of learning-style responsive versus traditional approaches on grammar achievement* (Boström, 2004), the question of whether insight into an individual's learning style profile facilitated the development of meta-cognitive understanding and meta-learning was raised. Additional questions that emerged were: *What does insight into one's own learning entail? What exactly is consciousness and how can the ability to learn how to learn be described? How can these issues linked to terms such as life-long learning and learning organizations? How can they be interpreted and implemented in the school context?*

This paper contains abstract terminology about the learning process, which while easy to use is difficult to make tangible. The terms learning styles, learning strategies, study technique and meta-learning are sometimes used without being fully defined in Sweden. Rules for usage and concrete examples are missing, and the terms are used synonymously and without delineation. Even more confusing, words like teaching, teaching methods, learning and meta-cognition are at times added. In an attempt to put these terms into context and to describe

possible connections and concrete expressions, additional conclusions from the previously mentioned thesis will be presented here.

The basis for choosing this topic is the notion that though it is considered the task of the school system to teach and to transmit knowledge, schools are incapable of supplying their students with all the information they will need in their lives. A main priority should be to provide students with means to search for, find, absorb, and use new information. The curriculum emphasizes that schools should create the best possible circumstances for enabling students to attain knowledge and offer an environment that encourages a positive attitude towards learning, even for those who have had negative learning experiences in the past (Skolverket, 1994). It should be the school's goal to make students believe in their own abilities, as well as better understand *their own learning* so that they can evaluate it. Most learning environments focus on the importance of providing students with the means, the self-awareness, and the skill set *to learn how to learn*. As teachers, we must first have insight and knowledge of *how* to present our students with the multitude of learning strategies they might need and how to provide access to them.

The purpose of this paper is to classify and, thereby, to enhance the understanding of different levels of the learning process in general, and, more importantly, to explore the combination of learning styles and strategy choice. With a better understanding of the conditions of learning and more precise knowledge of how choices of strategies affect learning in a positive or negative way, teachers' and students' consciousness may be expanded.

### Learning and teaching methods

The results of Boström's (2004) doctoral study revealed that the effect of using traditional (T) versus learning style (LS) adapted teaching methods (in the perceived difficult subject area of Swedish grammar) showed significant differences in several areas. Students' attitudes, evaluation of momentum as well as an understanding of the importance of proper grammar were significant at the 1% level while knowledge retention after five weeks was significant at 0.1% (see Table 1).

*Table 1 Specification of the control group's results compared with the experiment group in regards to grammar teachings*

<b>Groups (T &amp; T vs. LS &amp; LS )</b>	<b>Significance</b>
<b>Achievements</b> (Final test)	$p \leq .001$ ***
<b>Retention</b> (Five week test)	$p \leq .001$ ***
<b>Attitudes</b>	$p \leq .001$ ***
<b>Evaluation</b>	$p \leq .001$ ***
<b>Understanding</b> (of the purpose of grammar)	$p \leq .01$ **

\*\* statistical calculations show significant differences at the 1% level

\*\*\* statistical calculations show significant differences at the 0.1% level

Teaching based on the students' individual learning styles can thus be a way to individualize instruction and a method to enhance motivation. An understanding of teaching methods,

learning and learning methods appears to give teachers as well as students a means to life long learning. This raises the question of how this result can be linked to other aspects of the learning process in the Swedish school context. One might wonder whether participating students have developed a deeper understanding of themselves and the way they think about learning while also offering them a new insight into their own circumstances.

### Learning styles and learning strategies

The term learning styles first appeared in Sweden in the 1980's primarily in conjunction with leadership and organization development.<sup>1</sup> During the 1990's, it was introduced to the school system. Thereafter, the concept of learning styles was introduced to adult education in combination with PBL (with Kolb's model<sup>2</sup>) and in adolescent education in combination with the Dunns' model. In the present paper *Learning style* refers to the model presented by the Dunns and is defined as:

... the way the individuals begin to **concentrate** (pay attention), **process** (analytic versus global), **internalise** (commit to memory) and **remember** (be able to bring back) new and difficult academic information (Dunn, 2003).

The term learning styles used in this study refers to developing theories about learning styles or individual students' learning-style preferences. *Learning-style-responsive-teaching* (or *teaching methods*) applies to the methods corresponding with the students' style as outlined to them in their learning-style profile based on the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn, & Price, 1984, 1991, 2000). While learning strategies are viewed as a wider concept (Hellertz, 1999) are learning style adapted methods a more precise term for the chosen learning style theory. Nevertheless, it is ascertained that learning-style-responsive methods also can be defined as learning strategies (Dunn, 2003).

The term *learning strategies* is defined in Dunn and Dunn's learning-style research as "... *the methods through which teachers teach and/or learners learn; CAPs, PLSs, MIPs,*<sup>3</sup> *tactical resources and kinaesthetic approaches*" (Dunn, 2003). The individuals who participated in Boström's (2004) study were given concrete examples of learning-style strategies. The question arises if it is possible for the participants to fully comprehend other learning strategies they have either consciously or unconsciously used?

When asked to define the term learning strategies, educational researchers give different definitions and add other dimensions to the term. Learning strategies can be defined as conscious or unconscious choices made by the teacher or the student. Learning strategies can be spontaneous choices, learned or conscious patterns (Hellertz, 1999). Oxford (1990)<sup>4</sup> differentiated between direct and indirect strategies. The former are techniques that students can put into practice, for example *memory strategies, cognitive strategies* and *compensational strategies*.

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<sup>1</sup> Lärstilshandboken by Honey & Mumford was published in 1982 by Studentlitteratur and provides an introduction to the concept as it pertains to personal accomplishment in learning situations in the professional field.

<sup>2</sup> David Kolb's learning style model is based on the way the brain processes information and it contains four different ways to do so.

<sup>3</sup> CAP (Contract Activity Packages), PLS (Program Learning Sequences), MIP (Multisensory Instructional Packages) are effective methods as evidenced by learning-style research and may be matched successfully to different types of learning styles.

<sup>4</sup> Oxford used the definition in regards to learning a foreign language.

Indirect strategies by her definition are *meta-cognitive* strategies as well as *emotional strategies*. O'Malley and Chamot (1990) made a similar classification of learning-style strategies with the sub-grouping of cognitive, meta-cognitive, and socio-affective strategies. Schmeck (1988), however, claimed that all strategies are conscious choices informed individuals make to implement their abilities.

Another variation of learning strategies encompassing reading can be found in the CRISS-project<sup>5</sup> (Santa & Engen, 1996). A central focus in this research is that the teacher should be able to give the students enough competence to implement the strategies themselves and to make the students aware of their individual styles so that they can create their own strategies. In Sweden, Hellertz (1999) identified the following learning strategies for students majoring in social science: listening, questioning, talking, thinking, intuition, action, reading, writing, vision as well as combinations of the previous strategies. She questions whether these should be defined as ways of gaining knowledge or as learning strategies. Compared with learning strategies it is clear that a few of the above strategies are better defined as perceptual preferences.

Tornberg (2000) used the concept learning strategies and pointed out how they take on a distributive role, since the students' previous knowledge, their learning style and the problems they are faced with are found to influence their choice of strategy. She emphasized that we are better able to understand the conditions under which learning takes place and create a consciousness among teachers and students, if we understand how the choice of strategy influences learning in a positive or negative manner. Tornberg pointed out problems with classifying, defining, and describing the strategies and choosing which strategy to use to solve a specific problem. She would like to see a well-founded classification system rather than the long list of strategies in future studies making research more user-friendly. Findings from the PEEL project<sup>6</sup> showed that ineffective strategies used by students are a direct result of incorrect decisions made in the learning process and that it takes energy as well as hard work to replace ineffective strategies with strategies based on an understanding of one's individual needs.

The term learning strategies also occurs within organizational theory and work environmental research. One term for this is Human Resource Management (HRM), NUTEK (2000). The concept is also used in sports psychology in connection with goal setting, word pictures and internal visualizations (Anderson, 2001).

It seems reasonable to assume that different students will use different learning strategies depending on what works for them and that they will be able to use to their advantage to varying degrees. We have learned from learning-style research that different teaching methods match different learning preferences. For example, dramatization and field studies correspond with kinaesthetic strategies; contract activity packages (CAP) are more appealing to students with strong internal motivation, internal structure, and several prominent perceptual preferences (Dunn & Griggs, 2003). A more precise and more specific systematisation of learning

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<sup>5</sup> CRISS is short for Content Reading Including Study System, which is an organized, structured learning model about reading, learning strategies and meta-cognition with many concrete examples. Examples given are practices in text structures, evaluations before and after reading, highlighting techniques, different types of note taking techniques as well as structure planning.

<sup>6</sup> The PEEL-project (*Project for the Enhancement of Effective Learning*) started in Australia in the 1980's. Its purpose was to improve learning based on one's own thinking. Mälardalens högskola is the center for a Swedish based PEEL network.

strategies should be proposed in conjunction with learning-style theory. A concrete example may be the use of memory maps (mind maps), a common tool used as a learning strategy to process information in a holistic manner. At the same time, students who process information in an analytical manner appear to benefit more from using other ways to structure information, such as text field or module models.

We can assist our students by making them aware of which strategies can be used for different tasks and then letting them try out what works best for them. While explicitly teaching strategies, it is important not to focus on the technical aspects only, but to make sure that students are aware of their own style of learning and take initiatives. A reasonable assumption is that students in the study found learning style methods to be an important aspect of their learning process and were able to use the examples of strategies given to them as well as being able to develop new strategies.

Additional areas to investigate are connections between choice of strategies and use of strategies, in combination with successful learning. It reminds us of asking what came first: the chicken or the egg? Is an individual successful because of the strategies chosen or does a student who is successful in school use the most suitable learning strategies simply because she or he is learning successfully?

A valid question is whether there is a difference between the concepts of learning strategies and study techniques. The latter concept is often included in textbooks for the subject of Swedish in high school.<sup>7</sup> In the five textbooks examined for the study, similar excerpts were found in four of the books.<sup>8</sup> Different techniques for note taking, reading, text processing, as well as memory and forgetfulness are described. Memory maps are also used in these four examples as suggestions for note-taking and structuring organization. It is implicitly assumed that the presented study techniques are suitable for all individuals. Even in the fifth textbook, *Svenska Timmar - språket* (Skoglund & Waje, 2000) some study tips are given in serious conflict with learning-style research. One example is the following:

Take notes continuously! There is otherwise a great risk that you may miss out on important information (p. 25).

If we simply take a look at perceptual preferences, it is easy to see that a large group of learners (approx. 20%) are auditory, many of whom are incapable of listening and taking notes at the same time (Dunn, 2001). Presuming that a truly auditory student tries to take this advice to heart, the consequences can be inefficient learning.

### **Meta-learning, learning, and teaching methods**

Meta-learning, as the term implies, is about learning how to think and learn. According to Stensmo (1997), this process is either facilitated or obstructed by different types of emotions. The learning process is guided by the responses given by the surroundings and oneself. Stensmo divided meta-learning into at least two different levels: *procedure knowledge* (knowledge about abilities, strategies and resources that are necessary to complete a task) as well as

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<sup>7</sup> It is here implicitly expressed that study technique is a topic that should be considered by teachers of the Swedish language.

<sup>8</sup> The book with a very different view point is *Svenska Uppslag* (Skoglund, & Waje, 1998).

*the knowledge of completion* (understanding that the task is complete, one has retained the information and knows how to move on).

Meta-cognition is defined as thinking about thinking. Some examples include (a) being aware of one's own thought process, (b) problem solving, (c) decision-making and (d) interpreting written discourse. It is a science that uses the self as the subject. Meta-reflection is a prerequisite for, as well as a result, of learning. How does meta-learning relate to meta-cognition? If an individual has learned about his or her own learning, does it mean this person has meta-reflected? In contrast, if one is thinking about one's own thinking, does it necessarily mean that one has learned about one's own learning? Ellmin and Ellmin (1999) believe that reflection can occur on several different levels, but will remain a necessary foundation when an experience is converted into learning about learning.

If we were to systematically photograph our experiences, would it mean we have learned about our own learning? The question then becomes what should be considered as part of the concept of learning. While this is still a concept difficult to grasp it seems scientists attach different qualities to the term. Two examples are the following: Hård af Segerstad, Klasson, and Tebelius (1996) claimed that learning facilitates a change in an individual's view of his or her surroundings and himself or herself as a person. On the other hand, Ericson (1989) defined it as an internal, active and outwardly invisible process that can lead to a change in behaviour.

In other words, learning should facilitate changes in the way one acts, thinks, or feels, as well as changes in the individual's personality. This development can be achieved in several different ways. The conclusion can be drawn that meta-cognition *may* lead to meta-learning but that this is not necessarily always the case. It can also be understood that meta-cognition includes, and is a prerequisite for, meta-learning.

How can we connect teaching methods with meta-learning? The term teaching is at the heart of the present study and can in prof. Kroksmark's words be defined as "*...something that is carried through by a person using clear and well chosen methods to convey information that another individual is expected to learn.*" Will the teacher's methods lead to a development in the students' meta-cognitive skills? To define the concept teaching in scientific terms is not an easy task (Arfwedson, 1998; Kroksmark, 1997). It is no less difficult to separate teaching from learning or other activities.

When it comes to teaching and learning, Kroksmark (1997) pointed out that these terms are related. They can be two sides of a coin, two integrated entities that are not interchangeable but make up two parts of a whole. Teaching can lead to learning, but this outcome is not to be taken for granted. Learning can also take place without teaching.

## **Conclusion and discussion**

Organizing various theories in a paradigm that describes, underlines, and turns the learning process into something concrete, necessitates a better understanding of the dynamics of learning than presently available. If we focus only on theory, we limit ourselves and our learning. If a theory is complemented by other complex and dynamic elements, it may be possible to divide learning levels systematically and uncover their connections.

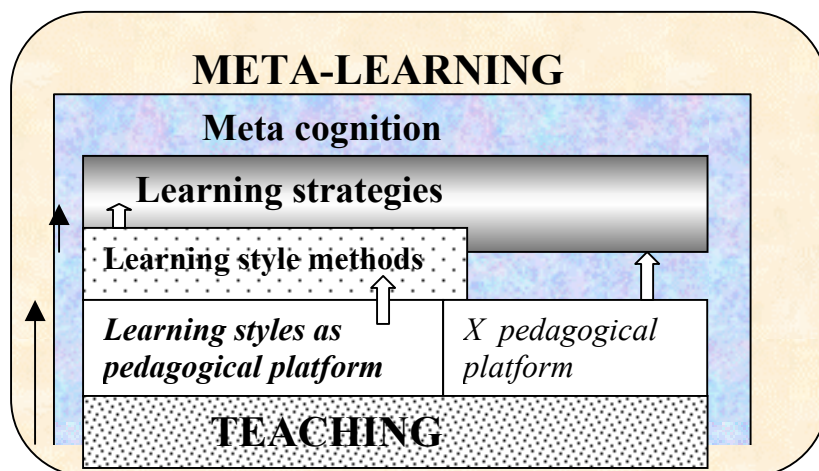
In the thesis *Learning and method: Research concerning the effects of learning-style responsive versus traditional approaches on grammar achievement* (Boström, 2004), positive connections were shown between methods adapted to the students' individual learning style and the results of learning. However, two expandable scientific fields were elicited: the tension between different definitions in learning style research and an effort to put these terms into context.

This paper is an attempt to explore the teaching-learning paradigm. Figure 1 was developed to illustrate the different categories and relationships existing in this paradigm. Teaching is a learning activity aimed at guiding students toward learning. The methods chosen can be based on individual learning styles and, as an outcome, chosen methods should match the individual's learning-style preferences. Learning-style theory points out the methodical pluralism and claims that students choose the method best suited for their needs. Many different methods will naturally be used at different levels for one individual.

The prevalent—and seemingly frequently used—term *study technique* appears to be a rather general concept belonging in another paradigm. In contrast, learning strategies can be utilized and developed. This is a broader concept and may include learning styles. All learning methods may be considered learning strategies. The latter can, however, include memory strategies, note-taking techniques, and emotional and cognitive strategies. An interesting question is whether it is possible to base the choice of learning strategies on one's individual learning style. Can it be that certain learning-style characteristics correspond with certain learning strategies?

When learning strategies are internalised as cognitive abilities, we can compare them in some ways with meta-cognition. Because students are able to identify and define their individual learning strategies, they are faced with possibilities to: a) make more precise demands on teachers, their school and their education from an individual's stand point; b) reflect on and understand their own learning, thus enabling them to do their homework, solve problems and better sort through the flow of information; c) better understand the grammar of the school system making it easier for them to participate actively.

When reflections on one's own thinking about learning lead to a consciousness of learning, one has achieved meta-learning. The question is what comes next. For us, it will be to utilize the various concepts in every day situations and to continue to research didactic theories in reality as it pertains to the school context.



**FIGURE 1:** Visualization of the relationships among teaching methods, learning styles, learning strategies, meta-cognition and meta-learning.

Note: "X pedagogical platform" could be any pedagogical platform.

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