

Felder's Learning Style Concept and its Index of Learning Style Questionnaire in the Slovak Conditions

Lada Kaliská¹

¹ Department of Psychology, Faculty of Education, Mathias Bell University in Banska Bystrica, Ruzova 13, Banska Bystrica 974 11, Slovakia, lada.kaliska@umb.sk

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Abstract This research study emphasizes the necessity of learning style awareness and assessment as a possible way leading our learners to their own learning process auto-regulation with an aim to develop the key competence of life-long learning. It introduces a new learning style concept of R.M. Felder and the concepts it has originated from, Kolb's experiential learning theory and Myers-Briggs' learning type model. It offers the first results of psychometrical properties (reliability in the sense of stability in time) of Felder's *Index of Learning Styles* questionnaire (used in the text as ILS). Statistical analysis proved not sufficiently significant correlations in the Slovak conditions.

Key words Learning styles, Felder's learning style concept, ILS questionnaire, Kolb's learning cycle, Myers-Briggs' MBTI model

1. INTRODUCTION

The *learning to learn* competence belongs among key competences postulated in the State Educational Program in Slovakia influencing the curriculum formation of our all educational system degrees. We do realize that only a student himself decides if the learning process happens, and a teacher only if he/she knows the preferred learning style of a learner, then he/she can facilitate this process, activate and possibly make it more effective. Regardless that one of the first effective projects of educational transformation in Slovakia – the Millennium Project (2002) already emphasized the necessity of learning style discussion and its implementation into education, this issue has been discussed, analyzed and verified only by a very few researchers in the area of Psychology and Pedagogy in Slovakia (one of the first ones was Kulic, followed by Sarmany Schuller, Turek, Sollarova, Sollar, Oravcova, Muzikova). In the Czech Republic, there was published only one publication concerning this matter by Mares (*Pupil and Student's Learning Styles*, 1998). Though we can find thousands of studies devoted to learning style issues abroad (e.g., Kolb, Schmeck, Riding & Rayner, Curry, Davidman, Dunn & Dunn, Price, Gregorc, Kirton, Galotti, McCarthy, Myers & Briggs, Sternberg, Messick, and a lot more of others), and more than 70 new learning style concepts are being verified (Coffield, 2004). Every researcher had and still has been trying to form not only the theoretical, but also a practical model explaining the way students acquire and process presented information. He/she has created very often a diagnostic instrument

to assess the learning styles of his/her concrete theory with an aim to be able to identify individual learning characteristics of a student. If a teacher understands student's preferred learning style, he/she can manage his/her teaching technique to increase the educational process efficacy and to increase the potential of student's better achievement at school and student's approach to the learning process itself.

Realizing this proved positive impact of learning style based education (Sternberg, McCarthy, Dunn & Dunn), we have been interested in learning style issues of Kolb, Schmeck, Dunn & Dunn, Fleming, Entwistle's theories and others for more than ten years. We have published a book based on Kolb's theory (*Learning Style Conception Aimed at Kolb's Theory*, 2009) where we analyzed theoretically his concept, verified his diagnostic instrument, and also emphasized its possible applications into the educational process. We are aware also of the problematic and critical issues of this theory and its diagnostic instrument.

There are several reasons why we have started to analyze in depth *R.M. Felder's Learning Style Concept*. The first one is there is no exactly statistically verified diagnostic instrument of learning styles in Slovakia, then our long interest in this issue, and then the need to provide an effective instrument of learning style assessment with proper psychometrical properties such as reliability and validity to teachers at schools and psychologists in counseling process. The final, but not last reason was that of the concept of R.M. Felder's theory of learning style itself and its corresponding diagnostic instrument with fairly sufficient psychometrical properties (Felder, Spurlin, 2005).

1.1 Kolb's Experiential Learning Style Cycle

C R.M. Felder's model is based on one of the most famous and also one of the most criticized learning style models, on the experiential learning theory of D.A. Kolb. The common base for establishing both theories is a self-regulation as an organizational educational principle (Kolb, 1984, p. 18; Felder, 1988). Kolb integrated his ideas into a model describing student's perception of immediate concrete experience through his senses, feelings and experience with world and personal self; this is the knowledge acquired through practical experiences or through the process of "acquisition". The concrete experience is a base for student's learning process, and then he

realizes learning on the basis of “*intuition*” by Kolb (1984) or on the basis of “*experience*” by Mares (1998). Then next stage of learning follows – reflective observation giving a sense to this experience. In this stage, a learner reconsiders his concrete experiences from different perspectives, thinks, reasons, evaluates and expresses why and how the experiences emerged and their meanings. The learning process is a result of patience, objectivity, careful judge and observation transformed by intention or connotation. A student is aimed at “*reflection*” by Kolb and at “*perception*” by Mares while learning. The reflection helps a student to split experience into elements and then to categorize them. The result is then a formation of abstract notions, generalizations combining then into theories, i.e. next stage follows – abstract conceptualization. Now a learner understands a general concept arising from a concrete experience, starts to combine reflections of basic elements of the experience into a general model, analyzes, abstracts, and uses logical conceptions and thinking processes to understand a problem by the usage of conscious insight process. He concentrates on the process of “*theorizing*” by Kolb and on cognitive process of “*thinking*” by Mares. The last stage is active experimentation enabling students to manipulate, experiment, apply theories formed during the abstract conceptualization process. In this last stage a learner aims at “*activity*” by Kolb and at “*functioning*” by Mares. All these stages can appear within one second or within a few days, weeks or months depending on a student’s interest or topic. The theories formed in this learning process help to create predictions of the world, and then to act. Though a learner’s activity is a new concrete experience being richer, then the cycle can start again. If we wanted the process of learning to be more effective, the cycle should follow all stages (Smith, 2005).

According to this cycle, Kolb described two individual learning processes: dimension of perception and acquisition of knowledge – either through forcing a conceptual interpretation by thinking or symbolic expression of world by feeling. The second dimension is characterized by processing or transformation of knowledge – either through active external manipulation by activity or inner observation by reflection. Kolb’s experiential learning cycle forms a base for his four basic learners’ learning styles combining two dimensions of the cycle. Kolb in some of his studies analyzed personal assumptions of every learning style type in relation to educational methods, forms; strategies of their effective learning process and their professional orientation (consider closer Kaliska, 2009).

1.2 Myers and Briggs Learning Type Model

The next influencing model of Felder’s one is a multidimensional implication of learning styles by I. Myer and K. Briggs. Their model was directly derived from Kolb’s model and Jungian personality theory. They supported their theory by constituting a learning style questionnaire *Myers-Briggs Type Indicator (MBTI)* used further in the text) in 1962. Their learning style was operationalized in the interaction of a scale consisting of two stimuli or psychological energies: *introverts* (are *reflexive* learners, preferring to use their subjective energy arising from their inner self: thoughts, feelings, perception) and *extraverts* (preferring interactions with outer world: they are *active* learners). In these two poles, learners depend on two different processes of adaptation: *sensing* and *judgment*. The ones preferring sensing use sensitivity to acquire information using all five senses, and they are concentrated on facts from a situation. Another type of sensing is using six senses, i.e. *intuition*. These learners are more creative and inventive. Then people make decisions and judge also by using two different ways: those ones preferring *feelings* and judge according to the importance; they always reconsider the objective reality according to their strong beliefs. The next type represents those ones preferring *thinking* and using causality

relations to judge the world according to logical consideration. There are constituted four dimensions to assess learning styles of Myer-Brigg’s questionnaire on these facts represented in a table numb. 1.

Table 1. Learning Style Dimensions of MBTI

Dimension Characteristics	Dimension/ learning style	Acronym
The attitudes towards learning concern:	<i>Extraversion – Introversion</i>	E-I
The perception processes in learning are:	<i>Sensing – Intuition</i>	S-N
The judgment processes in learning are:	<i>Thinking – Feeling</i>	T-F
The activity styles in the outer world are manifested through:	<i>Judgment – Perception</i>	J-P

This theory is based on relation judgment between two preferences where one process of the dimension is dominant for a certain learning style. There are formed 16 personal learning style types by the combination of these four dimensions and a preference of a certain process (introverts – thinking and sensing types: ISTJ, ISTP, ISFJ, ISFP; introverts – emotional thinking types: INFJ, INFP, INTJ, INTP; extraverts – thinking and sensing types: ESTP, ESTJ, ESFP, ESFJ; extraverts – intuitive thinking types: ENFP, ENFJ, ENFJ, ENTP, ENTJ). This classification was based on facts how “each individual learning type perceives the outer world, makes judgments or is aimed at the inner world of thoughts and concepts or at outer world of people and things, and also the way he/she reacts to various situations” (Salter, Evans, Forney, 2006, p. 178).

Salter, Evans and Forney (2006) analyzed both above mentioned learning style theories and their relevant questionnaires – Kolb’s *Learning Style Inventory (LSI)* and *Myer and Brigg’s Type Indicator (MBTI)* to assess the learning style stability of 292 university graduates in their first year of study. Retest testing was done with only 222 respondents (83 males and 139 females) at the beginning of their second year of study and at the end of this year. The learning style stability was verified significantly in all learning style types of *MBTI* questionnaire and in assimilator, accommodator and divergator learning style of *LSI* questionnaire.

1.3 Felder’s Learning Style Concept

These two very shortly described learning style theories inspired the establishment of a new learning style concept of R.M. Felder who works as a professor of Chemical Engineering at the University of North Carolina, USA nowadays. Felder formed a theory corresponding diagnostic instrument *Index of Learning Styles* (shortly *ILS*, mentioned further in the text) in cooperation with B. Solomon, a counseling coordinator, in 1991 which was based on the first version of it consisting of five dimensions and created by Felder and L. Silverman, an educational psychologist at the University of Denver, in 1988.

Felder’s learning style concept was directly influenced by Kolb’s theory where a dimension active/reflexive is analogous to a dimension of *active/reflexive* in Felder’s *ILS* questionnaire, and a dimension of sensing/thinking is represented by a dimension of *sensing /intuition*. The author differentiates learner’s types according to their certain preferences in learning process, however, his learning styles do not result as a combination of dimensions as Kolb’s ones do. He describes concrete four dimensions consisting of

two poles representing bipolar modalities of learning process. According to his opinion, every learner inclines always to one certain pole, though we cannot say that only category is typical for a learner because his/her learning style is formed by combination of certain dimension preferences in learning process.

Myer and Brigg's model was inspiring for Felder reflecting extraversion/introversion dimension of their personal questionnaire in the sense of *active/reflexive* as a first dimension in his diagnostic instrument *ILS*. The extravert type is active in various fields, prefers a great number of activities; he prefers working in a group, is sociable, and has a lot of friends. The introvert type uses especially thinking in the process of learning, he/she reflects his/her ideas and images, prefers working alone the most with one or two people.

The second dimension of *ILS* is analogous to *MBTI* model – it is *sensing/intuitive*. Learners preferring sensing acquire the information by using their five senses (sight, hearing, touch, smell, taste). They are interested in what is actual, real, current and common, and they remember important details. The intuitive types stress the impression and importance. They prefer learning when they can think about the problem rather than to use concrete experience. They think about the future rather than past. They prefer abstract information (Myers, Briggs, 2009).

Felder's learning style concept assessed through his *ILS* questionnaire is represented by four dimensions. To two already mentioned dimensions influenced by Kolb's and Myers-Brigg's theories, two other dimensions are added. That is why according to Felder's model, a learner rather prefers one certain modality of each dimension:

- active / reflective
- sensing / intuitive
- visual / verbal
- sequential / global.

There were five dimensions in the original version of *ILS* questionnaire. The last one was *inductive / deductive* dimension. Later on, Felder (2002) realized that induction and deduction are both different learning preferences requiring different teaching approaches where the better one is inductive teaching strategy. On the other side, American, but also our educational systems concentrate more on deduction implementation into learning process (using especially perfectly ordered and concise presentation of facts to be learned). Because of this fact, the author himself did not want teachers to use and to concentrate on traditional teaching educational methods, i.e. deduction, even though it seems to be less effective, so the author eliminated this dimension from a questionnaire not to facilitate these thinking operations in learning process.

Felder classifies learners into a learning style type according to their learning dominance to one pole of a certain dimension in his *ILS* concept. Those ones preferring *active learning style* have a tendency to solve a problem the best when they practise something actively, when they can apply the information, when they can ask questions. They need to experiment actively with a new learning material. They prefer cooperation; make contributions of new, creative, challenging ideas into the educational process. The opposite learning style is a *reflective learning style*. They prefer thinking before doing; they need to abstract the information. It is a learner type that likes considering and looking for interrelations. They prefer theoretical concepts and working alone.

The *sensing learning style* learner prefers sensing while learning; they are excellent in remembering facts by using lower thinking processes (memory). They solve problems by standard procedures;

they do not like surprises and unexpected complications. They are rather patient while working with details, careful while elaborating a problem, however, on the other side, they prefer rigidity, certain stereotypes in thinking. They have a tendency to control their work, and because they prefer practicality in learning process, they need to apply the acquired knowledge into a real world. The *intuitive learning type* learner relies the most on his/her intuition, imagination and thinking. He/she prefers innovation, is bored with repetitions and routine activities. On the contrary to sensing type, he/she considers details to be boring, and then the complexity, unclear solutions reflect his/her preferred learning process. He/she uses divergent thinking that is rather quick while solving problems and rather not so careful, less patient or inattentive.

The *visual learning style* type learner prefers rather information presented in a visual picture form of graphs, diagrams, maps, charts, tables, films than in a form of spoken or written form. He/she prefers information acquisition on the bases of visual perception and sensing. On the contrary the *verbal learning type* learner prefers the text itself and its explicatory essay. He/she remembers the best what he/she hears it. Felder (2002) explains that the visual/verbal dimension was firstly labeled as visual/auditory. He changed it because he stated that the visual information consists clearly of diagram, charts, pictures and the auditory information consists clearly of spoken word and other sounds. However, one of the information transfer means is not clear, and it is a written text being perceived visually and transmitted verbally, and that is why it cannot be categorized as auditory. The cognitive scientists found that our brain transforms written word into its spoken equivalents, and then it processes the text in the same way as a spoken word. A picture (visual) is a real form of a word whether written or spoken (verbal). The spoken and also written words are found both in verbal category according to the author.

The *sequential learning style* type learner studies proportionally, sequentially, through small steps related in logical sequences. This learner type prefers convergent thinking using basic thinking operations (analysis, synthesis) that enables him/her looking for wider relations. The *global learning style* type learner or labeled also as holistic type learner studies globally, i.e. he/she absorbs the material accidentally without looking for mutual interrelations. The study material is learned more or less intuitively and a learner is not able to explain the way he/she solved a task. This learner needs to see a problem first of all as a part of a whole context, then he/she can understand and apply it into practice. The presented material is acquired as puzzle pieces needed to be put together into a complete picture. His/her stronger side is divergent thinking.

The author himself realizes there are various preferred types of information acquisition and transformation in the learning process. There is no good or bad learning style. An individual has only a tendency to prefer one or the other learning style. The concrete learning style based on one of four dimensions does not restrict a learner to achieve excellent school achievement. The necessary assumption is just to guide our learners through various forms of learning styles, and then to lead them the right way (Felder, 2002). Our first aim should be to teach our learners to regulate their own learning process, so they will be taught to use effectively once sensing and then intuitive learning style, sometimes active or reflexive style while they are following a task globally or sequentially in its visual or verbal form. The optimal solution is to modify the preferred learning style according to the learning situation requiring various learning strategies or tactics.

2. RESEARCH RESULTS

One of the basic teacher's competences is to offer students various teaching methods and forms to guarantee the educational assumption reflecting a student's learning style. Nowadays there is no sufficiently verified psychometrical instrument to assess a student's preferred learning style in Slovakia. This fact led us to a scientific research aim that was to verify Felder's learning style concept by using his psycho-diagnostic instrument *Index of Learning Style – ILS* to identify certain learning styles according to his theory. We identified preferred learning styles of undergraduate students (N=37) studying Psychology in their second year of study at Faculty of Education at UMB in Banska Bystrica, Slovakia. Especially for this study we concentrated on a psychometrical property of reliability in the sense of time stability (test-retest) of an adapted Felder's *Index of Learning Styles* questionnaire (ILS) in the Slovak conditions. This research sample was chosen intentionally because we work at the Department of Psychology of this concrete faculty, and the questionnaire was especially created for university students.

The current form of a questionnaire consists of four dichotomous dimensions: active/reflexive, sensing/intuitive, visual/verbal, sequential/global learning style covered by 44 items. To assess the styles we used the instructions provided by the author himself. The students' score was reached on a scale from 1-11 in these four dimensions.

We stated scientific research question:

Q1: Is test-retest reliability of the ILS questionnaire significant in time?

Table nmb. 2 offers the findings considering test-retest reliability (time stability) of preferred learning styles of Psychology students. The correlation statistical analysis was used where it points at the concordance between results of repeated research instrument administration after two months. However, there is a need for psychological community to reach a positive correlation coefficient above $r=0,70$ to claim the questionnaire has a sufficient level of reliability/stability.

Table 2: Test-retest ILS questionnaire stability

Preferred learning style	r	P
Active / reflexive	0,651 ***	0,000
Sensing / intuitive	0,739 ***	0,000
Visual /verbal	0,892 ***	0,000
Sequential /global	0,506 **	0,001

** $p \leq 0,01$

*** $p \leq 0,001$

According to the statistical analysis of Pearson's correlation coefficients, we state that the ILS questionnaire proved high significantly strong correlations of test-retest stability accepted by a psychological community in two researched dimensions (visual/verbal learning style dimension, $r=0,892^{***}$; sensing/intuitive learning style, $r=0,739^{***}$). The active/reflexive and sequential/global learning style dimensions proved high significant middle strong correlation of test-retest stability though they are not sufficient to state statistical reliability in time.

3. CONCLUSION

In this study we presented the basic characteristics of Felder's learning style concept, and partially we explained its two ground theories – Kolb's and Myer and Brigg's one. Because of a current need to look for a clear psychometrical instrument of learning styles, we researched Felder's ILS questionnaire and its reliability. According to our results, we conclude that the adapted version of Felder and Silverman's *Index of Learning Style* in the Slovak background proved two dimensions (visual/verbal and sensing/intuitive dimension) out of four as highly significant in time. These two dimensions and their significantly high test-retest scores point at their high level of stability, eventually reliability. Felder (Felder, Spurlin, 2005; Zywno, 2003) discusses ILS questionnaire reliability in his several studies. His research sample consisted of engineering students and they assessed their learning styles after four weeks (N=46), after seven months (N=24) and after eight months (124). They proved high significant correlations ($r=0,804$ for active/reflexive dimension; $r=0,787$ for sensing/intuitive dimension; $r=0,870$ for visual/verbal dimension and $r=0,725$ for sequential/global dimension). According to their results, they considered this questionnaire to be adequately reliable. We reconsider several possibilities of our two weaker correlations, e.g., weak motivation of students, or not sufficient number of respondents. One of them could be possible weaker language translations of several items saturating active/reflexive and sequential/global dimensions. That is why we consider these first findings to be pre-research results of further psychometrical property verification of ILS questionnaire in the Slovak conditions. We state there is a need to modify the Slovak version and especially these two problematic dimensions also according to their inner consistency of their items, and then to verify its further psychometrical properties (its reliability with a larger research sample, as well its validity: construct, criteria, and other validities) to provide a proper psychometrically reliable and valid questionnaire of learning style for teachers and educational or school psychologists in our cultural setting.

To identify the learner's preferred learning style through using a valid and reliable psychometrical instrument by a teacher or by identification-diagnostic activity of a psychologist, it can help both to a learner, but also to this professional. It can help them to reconsider the teaching and learning styles, and then to choose the way to transform material and to modify teaching methods reflecting various learners' learning styles. Then a teacher can present his/her study material to students' possibilities and abilities that can improve their mutual communication and form a pleasant working climate. Finally, the learner's learning style awareness and its proper assessment will lead to a learner's own learning process auto-regulation aiming at development of a key competence of life-long learning.

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