

Learning styles of university students and language learning: Concepts, recent views and research-based recommendations

Učební styly studentů univerzity a jazyky: modely, aktuální vědecké poznatky a doporučení

Lenka Fišerová

Abstract: The contribution deals with Vermunt's – Van Rijswijk's constructivist model and inventory of learning styles (ILS). Students in experimental group learned English from arbitrary internet materials and control group students studied in face-to-face lessons. Common values and students scores were compared; in both groups identical ILS items exceeded common values range.

Key words: learning styles, language learning, common scores, information processing, university students

1 Pedagogy and learning styles

Since a series of overview articles and monographies covering the basic facts on learning styles (LS) and suggesting their categorisation have been published, this chapter concentrates entirely on essential information illustrating the problems concerned.

More than four decades ago, the concept of LS has been shaped in the field of pedagogy. Many definitions have been introduced, and manifold research tools have been developed resulting in wide choice of models. A general definition of learning styles can be stated to clarify the problems discussed. American researcher De Bello suggests that "Learning style is the way learners absorb, process and remember information" (1990, p. 204).

The section on learning styles can proceed with brief information on selected LS models originating in the field of pedagogy. Curry's onion model (Curry, 1991) compares learning styles to an onion with a flexible outer layer of learning preferences and a rather rigid sphere of personal characteristics in its core. Kolb's model of experiential learning (Kolb, 1984) presents learning as a process of passing through particular experience completed with reflective observation. Widely used Dunn's multidimensional model (Dunn & Shea, 1991) covers dimensions such as perceptual aspects, environment, personal emotions, sociological and physiological aspects and also ways of processing knowledge.

Later, a constructivist meta-cognition oriented model was introduced by J. D. Vermunt, a Dutch researcher (Vermunt, 1996). He was inspired by works of N. Entwistle, J. Biggs and P. Honey with A. Mumford (Fišerová, 2006). In phenomenographic interviews with first year university students, J. D. Vermunt discussed their cognitive strategies, mental models of learning, affective processes, and ways of learning process control (Mareš, 1998), which resulted in elaboration of a new LS model.

Among other constructs, the model deals with information processing and development of learning self-regulation. Basically, it comprises four rather complex types of learning styles: (a) the undirected one emphasizing cooperation, external learning stimulation, and ambivalent motivation; (b) the reproduction directed style used by students who rather reproduce items of curriculum than produce new (quality) knowledge and are subjected to external regulation; (c) the meaning directed approach based on deep processing of information, on seeking for relations between items of knowledge and on self-regulation of learning; (d) the application directed approach focused on practically oriented information and on relating items discussed at universities to those occurring in real life. To implement an investigation on LS, J. D. Vermunt and E. van Rijswijk, another Dutch educationalist, constructed a standardized questionnaire called Inventory of Learning Styles (ILS). The basic ILS dimensions and its individual items are stated in Table 2 in the Results and Discussion chapter hereafter.

Being focused on university students and on meta-cognitive processes, both the LS model and the ILS inventory might offer fairly promising potential for research on language learning in tertiary sphere (Fišerová, 2006). Nevertheless, certain specificity of the language learning process should be considered.

2 LS models focused on language learning

Besides general LS models originating in pedagogy, models focused on language learning have also been introduced. Two principal models are discussed hereafter.

Reid (1987) developed a perception preferences model reflecting comments of linguists, teachers, and English learners. The research instrument shaped on the model philosophy, the Perceptual Learning Style Preference Questionnaire (PLSPQ), covers visual, auditory, kinaesthetic, tactile, and individual/group learning preferences and its Appendix relates the PLSPQ to age, sex, subject of study, length of stay in the USA, and native/non-native speaker. In a study (Reid, 1999), students with higher TOEFL scores explored learning styles similar to those used by native speakers.

The model does not regard cognitive factors.

The other model, shaped mainly by Oxford (Oxford, Hollaway, and Horton-Murillo, 1992), specifies the following dimensions of learning styles of English learners in tertiary sphere: (a) visual, auditory or hands-on that expresses combination of tactile and kinaesthetic aspects; (b) extroverted or introverted; (c) intuitive-random or concrete-sequential; (d) open or closure oriented; (e) global or analytical; (f) field dependent or independent; (g) impulsive or reflective; and (h) feeling or thinking. Oxford et al. (1992) recommend language teachers to be aware of learning characteristics of tertiary students and to consider specific aspects of individual cultures.

Later on, dimensions of learning styles were reduced to three and a research instrument called Style Analysis Survey (SAS) was introduced. The SAS questionnaire focuses on (a) visual, auditory or practical, (b) extroverted or introverted, (c) intuitively or concretely sequential dimensions of learning styles (Carson and Longhini, 2002).

Both general and specific models of learning styles are explored to study the process of language learning; the general models predominate. A question on their applicability in the field of language learning has arisen. Up to now, they have been applied to study language acquisition quite commonly. This article represents a contribution to the discussion on shaping specific language learning focused models and on possible application of general learning styles models.

3 Methods and procedures

3.1 Experimental outline

The second year students of the Faculty of Chemistry, Brno University of Technology (BUT), became subjects of the experiment. The learners in the experimental group (EG) studied assigned general English topics using arbitrary language focused websites; hereby, the experiment was used as a research means. Before the trial, the subjects had been instructed how to find, use and explore proper internet based materials. Students in the control group (CG) used the Hotline intermediate textbook in regular face-to-face seminars one year later. Both the groups discussed identical topics and curricular items. No selection procedure was used because of lower number of students in both the consecutive academic years (46). The Czech ILS version adapted for English language learning (see Fišerová, 2015) was distributed in both the groups at the beginning of summer semester and at its end. The ILS research tool for tertiary sphere was selected due to its potential for research on the process of language learning.

3.2 Processing of results

Quantitative research was employed in the experiment; after the pre- and post-test administration of the ILS research tool, average scores for individual ILS items were calculated. The acquired values were compared with the common ones obtained in a study (Mareš, 2005) using Vermunt's-van Rijswijk's ILS (1996; Vermunt and Vermetten, 2004) and are discussed in further detail in the following chapter. This article complements findings acquired in a previous research.

4 Results and discussion

4.1 General notes

Common values represent scores obtained in a construct oriented research and they are values typical of the examined population; such an investigation usually covers a quite extensive set of subjects involved in recurrent administration of a particular research tool. In a series of administration of a questionnaire or inventory and during its standardization, statistical processing of scores is implemented and normality of Gaussian distribution is checked.

For ILS, the common scores are scores found between the first and third quartile limits; they were acquired after the administration of ILS to university students in a pilot trial (Mareš, 2005).

The common scores were obtained for non-linguistic university students; ILS items scores acquired in any further research have the potential to range mostly within the common scores interval. Thus, the average scores obtained during this author's research were also expected to fluctuate mostly between the common range limits.

To be compared with common ILS scores, the values obtained in this study are stated in Table 1.

Tab. 1: ILS items with average scores out of the common interval limits; the first value represents average pre- and the second one average post-test score. The used abbreviations stand for the following terms: EG for experimental group, CG for control group, CS for common scores, SS change for statistically significant change of ILS items.

ILS item	EG pre/post test	CG pre/post test	CS	SS change: EG/CG
Memorising	12.74/13.13	12.15/12.33	14–21	No/No
Concrete processing	12.20/12.17	11.43/12.24	15–22	No/Yes
Vocation oriented	16.84/17.17	16.91/17.41	22–25	No/No
Intake of knowledge	26.00/24.26	26.11/25.09	27–38	Yes/No
Construction of knowledge	31.02/30.07	28.89/29.11	35–41	No/No
External stimulation of learning	22.35/19.59	21.57/22.02	29–36	Yes/No

4.2 ILS items scores and common interval scores

Firstly, in both the experimental and control group, the average scores of the following ILS items exceeded the common score interval limits: memorizing, concrete processing, vocation oriented learning motivation, learning as intake of knowledge or construction of knowledge and external stimulation of learning. Some of the above ILS items like memorizing, concrete processing, and vocation oriented learning motivation showed tendency to approximate the common scores interval in both the EG and CG groups. In CG, construction of knowledge and external stimulation scores approached the common interval; in EG, on the contrary, scores of the identical ILS items showed tendency to recede from the common values interval, which in the case of lower external stimulation of learning can be considered a positive change. The above mentioned recession of external stimulation could have been triggered by teacher-independent learning from subject oriented websites. Understanding of learning as intake of knowledge dropped deeply out of the common scores interval in both the groups, surprisingly not accompanied by a significant change of any other learning conception but only with a slight improvement in construction of knowledge structures in the control group. During a longer experiment, significant changes of other ILS learning conception items might be expected.

4.3 The most significant deviations from common scores

Secondly, the ILS items most noticeably exceeding the limits of the common scores intervals are to be discussed. In the experimental group, external stimulation of learning (post-test, 33% below the lower common scores limit) and vocation oriented stimulation of learning showed the values most distant from the closest limit of the common scores interval (pre-test, 23% below the lower common scores limit). Accordingly, in the control group, the same ILS items exhibited the largest deviations: external stimulation of learning (25.6%, below the lower common scores limit) and vocation oriented stimulation of learning (23.1% below the lower common scores limit). Differences in deviation from the closest limit of the common scores interval are quite alike in both groups which might indicate a similar approach of the research subjects to learning. Lower motivation by their future profession slightly more improved in the control group. Quite high awareness of own responsibility for learning outcomes developed in the experimental group, which could be estimated from the markedly decreasing post-test average score in the external stimulation item (Fišerová, 2006). Nevertheless, wide generalization should not be considered because the research subjects were not selected randomly.

4.4 Out-of-common-scores items that showed statistically significant changes

Other interesting problems to be discussed are ILS items that showed statistically significant changes and, at the same time, exceeded the common scores interval. In the experimental group, learning as intake of knowledge and external stimulation of learning exhibited statistically significant changes. To a considerable extent, students understood learning less as intake of knowledge; provided that this change had been accompanied with some alterations of other beneficial learning aspects, it could be considered positive. The drop of external regulation was observed, which can be interpreted as an advantageous change. Concerning other ILS items exhibiting a statistically significant beneficial change like deep processing of information (critical processing 12.09/13.67, common scores 9–16) and self-regulation (self-regulation of learning process and results 21.59/24.52; common scores 17–28), they ranged within the common scores interval. Altogether, all these changes can be taken as profitable for university students.

In the control group, concrete processing ranked among items with the above characteristics. The students used the Hotline textbook which employs, similarly to other general English learning materials, concretization based tasks. The teacher also assigned them concretized and personalized tasks in face-to-face lessons. Both the concretized tasks in the textbook and in face-to-face lessons might have resulted in a significant change of concrete processing. On the contrary, the students in the experimental group studied from websites that usually do not employ concretized exercises, thus the change of this ILS item was rather small, not statistically significant. There was another ILS construct that showed a marked change in the control group: study motivation oriented on acquisition of a certificate (14.22/12.78; common scores range between 11 and 17). The certificate motivation scores decreased, which means that a certificate or a diploma was taken less as a study motivation. An interesting illustration of the above is a slight increase of the vocation oriented motivation; nevertheless, the change was not statistically significant (16.91/17.41, 22–25). Surprisingly, students might have been motivated by testing their abilities; the change was not statistically significant, however it almost met the criteria for statistical significance (16.41/17.48; 13–23; statistical significance 0.064; changes below 0.05 are considered statistically significant). Thus, a tendency to certain restructuring of learning orientation can be detected in the control group students.

4.5 General ILS common scores and scores acquired in language lessons

The Vermunt's-van Rijswijk's ILS was elaborated using data from students of various subjects. At this point, the idea on general aspects of learning and on those specific for language learning can be introduced and discussed.

On one hand, the generally shaped models of learning styles like Curry's, Kolb's and Dunn's have been used quite commonly to study the process of language learning. On the other hand, some language learning models like Reid's and Oxford's have been introduced. The potential of common scores acquired in non-linguistic subjects to meet those obtained in language learning can be discussed. As a particular example of a general learning process, language learning bears some of its features and, at the same time, it also shows some specific ones. Individual ILS items are elaborated as general constructs showing quite a big potential to cover processes of individual subjects learning, as apparent from Table 2. To a certain extent, concrete processing and also memorizing can be considered to be the items quite specific for language learning; their exceeding the range of common values might have been caused (at least partly) by their specific role in this particular process of learning. Other out-of-scores ILS items could bear a rather general character and, in the process of learning, they might play a somewhat universal role. Altogether, the author suggests that both the general and subject specific features of ILS items are apparent from the results of her research; however, the fact that there had been no random selection of participants makes the possibility to generalize the research results rather limited.

Tab. 2: *Four basic ILS dimensions and their individual items*

Cognitive processing of subject matter	Mental models of learning
Relating and structuring	Construction of knowledge
Critical processing	Intake of knowledge
Memorising and rehearsing	Use of knowledge
Analysing	External stimulation of learning
Concrete processing	Cooperative learning
Regulation strategies	Learning orientation
Self-regulation: learning process and results	Ambivalent
Self-regulation: learning content	Personally interested
External regulation: learning process	Certificate oriented
External regulation: learning results	Self-test orientation
Lack of regulation	Vocation oriented

4.6 Research based suggestions and recommendations

The author proposes further research on suitability of general LS models for investigation of language learning process and she also welcomes a discussion on necessity to develop specific models oriented on language learning. From her point of view, some dimensions of general models like information processing or self-regulation can be combined with aspects specific for language learning and a new complex learning style model can be elaborated.

The author also suggests further investigation producing ILS common scores for language learning and their comparison with those obtained in other subjects. For specific research on language learning, an extensive cohort of learners enabling random selection of trial participants is essential so that the gained common scores could be generalized for the field.

Finally, this chapter is concluded with some practical recommendations. The author emphasizes general awareness of ILS constructs such as critical processing, deep processing, self-regulation and external regulation of learning process and materials, which, nowadays, might not be commonly considered by all language teachers. Application of pedagogy concepts together with specific aspects of language learning appears to be a fruitful strategy.

Another practical recommendation concerns study materials. Due to the fact, that identical ILS items ranged out of the common intervals in both EG and CG, and because of absence of statistically significant difference in semester test scores (EG 88.04%/89.71%; CG 86.30%/91.60%; beginning/end of semester), use of web-based materials in combination with common textbooks and face-to-face environment can be recommended. Some of learning internet based materials can be proposed by teachers, some others might be suggested by students, which would reflect their personal experience and needs. Internet-based materials might provide factors students miss in common textbooks; the research on students' preferences in electronic learning environments (Fišerová, 2015) showed that students preferred clear layout of the learning content and feedback provided in key. Thus, teachers' experience and students' demands can combine in selection of proper learning websites. Moreover, use of internet-based learning environments shows potential to develop some aspects essential for learning like deep processing and self-regulation as stated in a previous author's work (2015).

Conclusions

Experimental and control groups of the BUT Faculty of Chemistry students were administered the Vermunt's – Van Rijswijk's Inventory of Learning Styles (ILS). Learners in the experimental group studied assigned general English topics from arbitrary language focused websites. Students in the control group used the Hotline intermediate textbook in regular face-to-face seminars one year later. The author found that the same following ILS items ranged out of the common intervals in both the groups; memorizing, concrete processing, vocation oriented learning motivation, external stimulation and learning as intake or construction of knowledge. The above finding could reflect common traits of language learning in different study environments. Out-of-range scores of concrete processing and memorizing might have been caused by their specific role in language learning. Other out-of-scores ILS items could bear a quite common character and they might play a somewhat universal role.

Concerning the ILS items that most noticeably exceeded the limits of common scores, the situation was identical in both the experimental and control group. External stimulation of learning and vocation oriented stimulation of learning showed the most distinct deviations from the closest limit of the common scores interval, thus exhibiting possibly specific character of the process of language learning, especially in the groups of technical university students.

In the experimental group, learning as intake of knowledge and external stimulation of learning exhibited a statistically significant change and in the control group, concrete processing ranked also among out-of-scores items with the above characteristics reflecting thus certain influence of the study mode employed.

The author suggests further research on suitability of general models for research on language learning process; from her point of view, dimensions of general models like information processing or self-regulation can be combined with language learning specific aspects. She also proposes further research focused on specification of ILS common scores obtained in the process of language learning and their comparison with those received in other subjects.

Awareness of ILS constructs such as critical processing, deep processing, self-regulation and external regulation of learning process and materials is also proposed. Based on the results of the experiment, use of web-based materials in combination with common textbooks and face-to-face learning environment can be recommended. Some of the learning websites can be proposed by teachers; some others might be chosen by students reflecting their personal experience and needs thus.

Considering generalization of the research findings, impossibility to select research subjects randomly should be taken into account.

Acknowledgment

The research was implemented within the 2112 – Institutional Support for the Development of Research Organizations (Institucionální podpora na rozvoj výzkumné organizace) Project (ID 22738) subsidized by Brno University of Technology, granted by MŠMT ČR.

References

- CARSON, J. G., & LONGHINI, A. (2002). Focusing on learning styles and strategies: A diary study in an immersion setting. *Language Learning*, 52(2), 401–438.
- CURRY, L. (1991). Patterns of learning style across selected medical specialties. *Educational Psychology*, 11(3 and 4), 247–277.
- DE BELLO, T. C. (1990). Comparison of eleven major learning styles models: variables, appropriate populations, validity of instrumentation, and the research behind them. *Reading, Writing and Learning Disabilities*, 6(3), 203–222.

- DUNN, R., & SHEA, T. C. (1991). Learning style and equal protection: The next frontier. *The Clearing House*, 65(2), 93–95.
- FIŠEROVÁ, L. (2006). *Potencial internetu pro rozvoj stylu uceni studentu pri vyuce anglictiny na vysoke skole* [Potential of Internet for development of learning styles of university students in English lessons]. Unpublished doctoral dissertation, Masaryk University, Brno, Czech Republic.
- FIŠEROVÁ, L. (2015). Learning Styles of University Students and Internet-based Environments: the Brno University of Technology Experience. *CASALC Review, 2014–2015(3)*, 19–37.
- KOLB, D. A. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice Hall.
- MAREŠ, J. (1998). *Styly učení žáků a studentů*. Praha: Portál
- MAREŠ, J. (2005). LENI, nechybí tady název článku? (Personal communication, June 2005).
- OXFORD, R. L., HOLLAWAY, M. E., & HORTON-MURILLO, D. (1992). Language learning styles: Research and practical considerations for teaching in the multicultural tertiary ESL/EFL classroom. *System*, 20(4), 439–456.
- REID, J. M. (1987). The learning style preferences of ESL students. *TESOL Quarterly*, 21(1), 87–111.
- REID, J. M. (1999). Affect in the classroom: Problems, politics and pragmatics. In J. ARNOLD (Ed.). *Affect in language learning* (pp. 297–306). Cambridge: Cambridge University Press.
- VERMUNT, J. D. (1996). Metacognitive, cognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Higher Education*, 31(1), 25–50.
- VERMUNT, J. D., & VERMETTEN, Y. J. (2004). Patterns in student learning: relationships between learning strategies, conceptions of learning, and learning orientations. *Educational Psychology Review*, 16(4), 359–384.

Author

RNDr. Lenka Fišerová, Ph.D., e-mail: fiserova@fch.vut.cz, Faculty of Chemistry, Brno University of Technology, Czech Republic

Author has been working as an ESP and EAP lecturer at Brno University of Technology, Faculty of Chemistry since 1996. Her interests include CALL, CBT, learning styles, and life-long learning. The author has widely been employing experience acquired in a London-based course for on-line teaching and also knowledge gained during her internship at the University of Notre Dame in Fremantle, Australia.