MULTIVARIANCE OF LEARNING STYLES AND EDUCATIONAL METHODS APPLIED IN FORMAL UNIVERSITY EDUCATION

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ABSTRACT

The aim of the research paper is to identify types of learners based on the Fleming VARK learning styles and selected learning models applicable in formal university education. The focus is on two higher education fields of study, namely Social, economic and law sciences (6213 – Economics and Management) and Education (7605 – Teacher Training and Educational Sciences). The introduction contains the explanation of basic concepts of learning styles and selected learning models. The results of questionnaire research distributed online in the period from February to April 2023 are presented in a separate part of the paper. Replies of 194 respondents from three countries (the Slovak Republic, the Czech Republic and the Hellenic Republic) were prevailingly processed by means of statistical methods and then verbally interpreted. Jamovi, Version 4.1 statistical software and MS Excel were used for data processing. To analyse data, we used contingency tables and descriptive statistics. Results of analysis show that most students belong to visual and kinesthetic types. Respondents' replies indicate the learning style models are mainly applied in the field of study Teacher Training and Educational Sciences. The research paper is written in accordance with the aims of the primary research project VEGA No. 1/0328/21 "Post-pandemic business management: identifying temporary and sustainable changes in sequential and parallel management functions in the context of the COVID-19 pandemic."

Keywords: *learning style (LS), educational method, models of learning style, formal university education*

INTRODUCTION

The aim of the research paper is to identify student types based on Fleming's VARK learning style model and to explore the applicability of learning style models in formal university education [1]. Learning style /LS) is the manner in which each learners starts to concentrate on new and complex information, processes them, absorbs and retains them (stores them in memory) [2,3]. The interaction of these elements varies with each learner; therefore, it is necessary to determine what it is that with the highest possible probability triggers the concentration of each student, how to maintain it and how to respond to the

learner's natural style of processing information, in order to store the information in long-term memory and retain the content. There are several student types specified on the basis of learning style (VAK, VARK models and others). The starting point of our analyses was Fleming's VARK model (visual, auditory, reading/writing, kinesthetic learning styles).We were interested if and to what extent the models of learning described in theory were applied in university formal education. [1], [2], [4]. The applicability of learning models was analysed in terms of fields of study.

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DESCRIPTION OF LEARNER TYPES AND LEARNING MODELS

For the needs of empirical analyses, we apply the classification of learners according to sensory preferences, developed by Fleming, and marked by the abbreviation VARK [1], which represents the first letters of four English words: Visual, Aural, Read/Write (verbal), Kinesthetic (movement). Subcategories of this classification include: visual-nonverbal (visual-image) learning style, visual-verbal (visual-verbal) learning style, auditory (aural) learning style, and kinesthetic learning style.

Learners with the visual-nonverbal learning style prefer sight when learning. Their preferred learning aids are usually pictures, diagrams, graphs, maps, photographs, films, or various symbols. In the text, important parts are distinguished in colour and graphics (arrows, blocks, or circles). These learners like richly illustrated and structured texts and even create diagrams and concept maps themselves and use them to explain concepts or ideas.

Visual-verbal learning style students prefer working with written text when learning. What they read, they can verbatim store in their memory and then precisely present the content. They record in writing what they have heard and then can work independently. Their abstract thinking is well-developed. The teacher can support these learners with worksheets and various sources of supplementary study materials [5].

Auditory learning style is preferred by students who learn best by listening and verbal communication and in discussions; therefore group forms of work are suitable for them. Auditory learners remember what they heard and repeat the material aloud while learning. Such individuals have a musical ear as well as the talent and prerequisites to successfully learn foreign languages. While learning, they are not distracted by background sounds, on the contrary, music supports their learning processes.

Kinesthetic learning style is preferred by students with a need for physical activity. When learning, these students enjoy moving around, cannot sit still for a long time, they like to learn while walking, and often need a break for a short movement rhythmic exercise, and only then can they continue learning. They enjoy learning by doing and like laboratory work, practical exercises, field trips, role play, or project learning. When working with this type of students, lecturers should consistently apply the didactic principle of connecting theory and practice. [1], [2], [3]

The issue of learning styles has been addressed by numerous authors who present their opinions and research results in comprehensive theories (models). To reveal these natural learners' preferences and learning styles, it is important to use a comprehensive learning style model that identifies each individual's strengths and preferences across the spectrum of physiological, sociological, psychological, emotional, and environmental elements. In the research, we implemented the selected learning styles in in the following structure:

- Curry Onion Model containing four layers: instruction preference, social interaction, information processing, and cognitive personality style;
- Riding's and Cheema's LS taxonomy, based on two dimensions: 1) processing of information: wholist analytic dimension and 2) presentation of information: verbalizer – imager dimension (with focus on verbal expression, speaking versus representation by means of pictures, graphs or diagrams);
- Rayner and Riding's typology (focused on learning, personality and cognition);
- The Myers and Briggs model is focused on the influence of personality types on learning styles. Their approach consists of processes (perception and processing of information); preferences (situations in which learning takes place, e.g., lightening, temperature, social interaction); and cognitive skills (application of cognition models to learning environment).
- The Kolb Experiential Learning Model contains four cycles: concrete experience, reflective observation, abstract conceptualisation, and active experimenting) [6, 7]

Thus, educational psychology students and teacher trainees learn that students have specific learning styles, and believe these styles should be in harmony with methods of instruction [8]. Some of the most popular learning styles schemas include Dunn and Dunn's Learning Styles Model [3], Kolb's (1984) Learning Styles Inventory [9], [10]. Kolb's (1984) learning styles inventory is popular especially in the USA. Its author claims that the learning processes of individuals differ in two dimensions, namely in the preferred ways of perception (concrete to abstract) and in information processing (active experimentation vs reflective observation). In his LS inventory, Kolb classifies individuals into four

types: divergers (concrete, reflective), assimilators (abstract, reflective), convergers (abstract, active), and accommodators (concrete, active) [10].

Learning style theories are applied in LS inventories, and these can be used in the world of commerce. For example, Hay Group distributed teaching materials based on LS theory as well as an information brochure (2008), the title of which says that people learn in various ways, thus a single learning style cannot be suitable for all learners. According to the brochure, practical advantages of learning style classification include their application in learning and in working contexts, as well as harmonizing the learning style and one's learning experience [11].

Most LS taxonomies are "type" theories, classifying people into different groups according to their approach to learning. The origin of these theories may be traced to the ideas of C.G. Jung (1964) in the area of personality types. Jung's ideas [12] were included in psychology test developed in the United States, namely Mayers–Briggs Type Indicator test popular in the 1920-ies. A successful application of this test contributed to the development of learning style taxonomies. Based on Myers-Briggs test, people can be categorised into several groups; this test provides useful information in decision making on one's employment [7].

METHODS OF EMPIRICAL RESEARCH

In empirical research, we focused on issues related to learning styles and application of LS models in education. During the preliminary research stage carried out using the interview method, we found out that several learning models are used in the practice of education, and based on empirical research, these learning models were included in our questionnaire. The interview conducted during the pre-research stage on a sample of 32 respondents became the basis for designing the questionnaire empirical research. The aim of the empirical research was to identify the opinions and attitudes of teachers in formal higher education regarding the assessment of types of students, and the level of applying learning and education models that are based on sound theoretical background.

The research was conducted using the questionnaire method. Questionnaires were distributed in person and electronically. Empirical research is applicable in all the fields of study listed by the Ministry of Education, Science, Research and Sport of the Slovak Republic [13]. We used the above classification not only for the Slovak Republic but for other countries. Due to the extensive scope of the issue, for the needs of the present research paper, we selected the following groups of study fields: Social, economic and legal sciences (6213 –Economics and Management) and Education (7605 – Teacher Training and Education Sciences).

The research sample of respondents was created by deliberate selection. Nominal and ordinal variables were observed in the questionnaire. Nominal variables were described by means of artificially (arbitrarily) created codes, which were assigned to individual categories and related to respondents' academic rank divided into assistant, assistant professor, associate professor, professor, lecturer and other options, as well as the designation of the field of study and the country in which the educational activity is carried out. Ordinal variables were characterized by the five-point Likert scale. The Likert scale of ordinal variables was used for student types in terms of Fleming's VARK model and selected learning models. [1] To analyse the results, we used the opinions of 194 respondents from three countries, i.e. the Slovak Republic, the Czech Republic, and the Hellenic Republic. The research sample in terms of the country and field of study is described in contingency Table 1.

Table 1. *Description of respondents by country and field of study*

Field of study	Number of respondents from country			
	Slovak Republic	Czech Republic	Hellenic Republic	Total
Economic, social and legal sciences	33	31	31	95
Education	34	32	33	99
Total	67	63	64	194

Source: own processing.

The research was conducted in the period from February 2023 to end April 2023.

The data collected were then analysed in the statistical software Jamovi Version 4.1 and MS Excel. To analyse data, we used contingency tables, and descriptive statistics in this paper . Results of statistical processing are presented in statistical surveys in tables and the findings are interpreted.

RESULTS OF EMPIRICAL RESEARCH

In the empirical research the focus was on respondents' opinions of types of learners (in terms of LS), who pursue formal university education. Learner types in terms of Fleming's VARK model and the Likert scale (0-5) are characterized in Table 2.

Table 2. *Respondents' opinions of learner types by selected countries*

Country	Indicator	Learner type			
		Visual	Reading/Writing	Auditive	Kinesthetic
Czech Republic	Average	4,06	3,33	3,79	3,35
	Median	4	3	4	3
	Modus	5	3	4	5
Slovak Republic	Average	3,73	3,43	3,81	3,09
	Median	4	3	4	3
	Modus	5	3	4	5
Hellenic Republic	Average	4,11	3,38	3,72	3,25
	Median	4	3	4	3
	Modus	5	3	4	5

Source: results of empirical research (evaluation in 0-5 interval, according to assumed number of occurrences)

The modus (or mode) characterizes the most frequently occurring value of student types. Based on the data from the calculation of the modus and median, it can be concluded that the types of students are the same in all the three countries of the sample. Most students belong to visual and kinesthetic types, followed by the auditory learner type, while the least common in the respondent sample is the reading/writing learner type. Based on the research, we conclude that neither the territory nor the field of study affects the composition of students in terms of learning style.

The following table lists the modus of value in the interval (0-5), which describes the level of applying a given learning style.

Table 3. *Selected learning styles and models of learning in formal university education (the table lists the modus of results)*

Country	Czech Republic		Slovak Republic		Hellenic Republic	
Field of study	A	B	A	B	A	B
LS models						
Curry Onion Model	1	3	1	2	1	3
Riding & Cheema's LS taxonomy	1	1	1	1	1	1
Rayner & Riding's taxonomy	1	1	1	1	1	1
Myers &Briggs' model	1	1	1	1	1	1
Kolb's Experiential Learning model	1	3	1	1	1	3

Source: Results of own empirical research. Field of study: A – Social, economic and legal sciences; B–Education

Based on the research results, it can be concluded that the selected LS models are applied at a very modest level. In the Social, economic and legal sciences field of study, the application of the learning models is evaluated based on the modus, and their frequency of occurrence achieved the modus value of 1. In the study field of Education, the Curry Onion model and Kolb's Experiential Learning model are used to a greater extent in the Czech Republic and the Hellenic Republic, where the modus value 3 was most often reported. In the case of the Slovak Republic, the most frequent occurrence of application was reported in the case of the Curry Onion model that achieved value 2. The other styles were assigned mode value 1.

CONCLUSION

Based on the calculation of the modus and median, it can be concluded that in all the three countries the types of learners (distinguished in terms of Fleming's VARK learning styles) are the same: most students belong to visual and kinesthetic types, followed by the auditory learner type, and the least common is the reading/writing learner type. Further, we conclude that neither the territory (country) nor the field of study affects the composition of students in terms of learning style. The analysis of respondents' replies in questionnaires shows the Curry Onion model and the Kolb Experiential Learning model are used to a greater extent in formal university education in the Czech Republic and the Hellenic Republic; the Curry Onion model was reported to be the most frequently applied model in the Slovak Republic.

Despite their popularity and wide spread in the world, learning styles theories stand for a controversial issue. On the one hand, they offer variability and recognition for learner's preferences; on the other hand, these theories have been criticized for the failure to provide a clear proof that the consideration of learner's style of learning can result in improving the quality of education [14].

However, there are reasons to believe that other factors apart from those analysed in the paper (country, field of study, and application of LS models) may have contributed to the wide spread of approach based on learning styles. In our future studies on learning styles, we would like to deal with these factors [15] as well as with the application of LS theories in meta-learning, since we believe that the awareness of one's preferred learning style in the context of the learning environment and the content of learning can increase the learner's involvement efficiency of learning, both in the case of individual learners as well as learning teams.

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