

# THE VARK MODEL INVESTIGATED AT THE STUDENTS FROM PPPE

## ***Keywords***

*VARK, learning style, non-parametric*

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## ***Abstract***

Learning style can often be the „shadow witness” of students' academic performance. Understanding and knowing this aspect may facilitate the process of academic transformation, and in some cases may suggest better methods of teaching and reporting to students. The study was conducted at Adventus University at the Pedagogy of Primary and Preschool Education in the period 27.02-07.03.2019. In addition to the indirect goal, it resides another one to highlight the levels of use of the four learning styles in the VARK model as well as the multimodal strategies applied by students. Also, there were differences in the different groups of both learning styles and multimodal strategies. The obtained results were compared with other specific research.

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## 1. Review of literature

The perspectives on education are changing and expanding daily and tend towards to an augmented environment where processes such as access to information, the views of others on the same topic, the relevance of new methods in current contexts, the diversification of techniques, etc. are facilitated. This extension implies in different ways both teachers and students in their implicit relationship with various current educational forms. In this education type, students can use more effectively their natural inclinations (called or converted into styles) to make learning more effective, can analyze information without being uninfluenced by the aspects in a class, can develop their educogenous personality traits, and indirectly can cause teachers to adapt classical methods to new realities.

Enunciations such as „learning style”, „cognitive style” and „style of information processing” are used by various researchers as having the same meaning, and in some cases are used in a rather inconsistent and confusing way (Brown E. et al. a., 2005, p. 81). Taking into account that learning styles operate in various contexts (Brown E. et al., 2005, p. 81), the way of approaching the material and the pedagogical act will be identical or similar regardless of the existing educational form. „Learning styles called cognitive styles are those cognitive, affective and generally psychic features that indicate how people learn, perceive, interact and respond to the learning environment. It represents all the cognitive characteristics that have a determining role in the learning process.” (Élthes, 2013, pp. 76-77). Transdisciplinary research focuses on analyzing the opportunities offered by contemporary learning from the perspective of students' learning styles (Covaci, 2016).

How can be defined the learning style? Dunn and others thought that „Learning style is a biological and developmental set imposed by personal characteristics that make the same teaching method

effective for some people and inefficient for others” (Dunn R., Beaudry JS, Klavas A., 1989, p. 50). The learning style is a construct that, along with learning preferences and cognitive styles, can be included in the umbrella term „personal style” (Sadler-Smith E., 1996, p. 29). In the opinion of Professor Elena Cocorada, „Learning styles describe how people like to learn” (Cocoradă, 2010, p. 184). After Vermunt „Learning style is an overriding concept whereby the cognitive and affective processes of the subject, metacognitive regulation of learning, conceptions of learning, and learning orientation are united” (Vermunt & Vermetten, 2004, p. 362). Personal style is an important psychological feature in the learning process through which it is possible to verify, discover and use appropriate features to improve learning. „Canfield and Lafferty discuss the conditions, content, ways and expectations; Dunns enumerates stimulus and elements; Gregor emphasizes distinct behaviors and dualities; Hunt refers to the conceptual level; Kolb brings attention to hereditary luggage, past experience, and the environment; Schmeck opposes the profound and superficial processing of information” (Dunn R. et al., 1981, p. 372). The learning style results from many directions of influence; there are correlations between the learning style and the hemisphericity (Scutelnic, 2010, p. 83) and, as E. Losîi also pointed out, „according to the most hereditary cerebral hemisphere, there are two cognitive styles: global style (right-hand dominance) and analytical or sequential (left-hand dominance) style” (Losîi, 2014, p. 68).

The learning style is further defined by Pritchard as (Pritchard, 2009, p. 41):

1. a certain way in which and by which an individual learns;
2. a way of learning, an individual preference or the best way to think, process, and demonstrate that information has been assimilated and so has been learning;
3. an individual's preferred means of acquiring knowledge and skills;

4. common habits, strategies or mental behaviors of learning as a particular way of thinking about the educational process the person has.

It is recommended that teachers assess students' learning styles and adapt their methods according to students' favorite styles and to the context of the group of students (Pritchard, 2009, pp. 32-33). Thus, the means of contemporary education allows students to use various components of their own learning style. However, at least three aspects cannot be denied, namely:

1. one of the most influential and promising tendencies in various types of learning is the tendency of „virtualization” which is in fact a „natural tendency of the evolution and organization of the real world” (Cucos, 2006, p. 15);
2. „Educational practice indicates an increase of learning motivation under the use of new technologies, as well as a massive demand for computer-assisted education, grafted on a growing need to keep up with the rapid changes in the skills profile demanded by the labor market . In this context, a solid theoretical foundation is needed in order to improve current education programs and to develop others in greeting the new challenges of knowledge-based society and contemporary didactic practice” (Istrate & Vlada, 2011, p. 38);
3. „The learning outcomes depend on the conditions in which students’ study,” estimated Bates and Sangra (Bates A. W. (T.), Sangra A., 2011, p. 147).

As a criterion for learning performance evaluation, learning styles are one of the key factors in learning (Mogonea, 2010, p. 124). The personalized learning style represent the personal characteristic that dictates the cognitive strategies adopted and produces the development of a model for addressing the learning tasks and subsequent manuscript adjustment. Test cases of the observed situations among the students were quite extensive. The

first category of students, and the most numerous, prefer graphic illustrations (Silveira RM et al., 2015, p. 2) (Simonds & Brock, 2014, p. 1) either when they receive some explanations, or when they themselves explains certain concepts or abstractions and implicitly retains what they see best. Other students prefer audio material and understand the information best when they hear it, others prefer kinesthetic rehearsal, and they can well remember the operations they have once performed or that they have practiced and applied in practice (Capita, 2011, p. 44). The formation of „cognitive schemes” (Piaget, 1969, p. 8) can be complemented or improved by using the means of current education type and using the various techniques taken from educational software: concept maps, memory maps, knowledge grammar etc. (Railean, p. 112).

Research suggests that more features influence the student's learning strategy: attitudes, motivation, culture, beliefs, age, learning style, tolerance of ambiguity, and „each feature develops in its own way, with unequal accumulations of time units. For example, the intelligence curve anticipates the following growth rate: about 50% in the range 4-4 / 5 years; about 30% between 4/5 and 8/9 and about 20% between 8/9 and 17/18 years.” (Neacșu, 2015, p. 61). An individual's learning style will affect how information is processed and thought during learning, and these will have a significant effect on the effectiveness and efficiency of learning (Bencheva, 2010, p. 1).

Research unwounded by Hall and Villareal (Hall & Villareal, 2015, p. 73) emphasized that in describing the most useful activities carried out in contemporary education, students tended to refer to these activities from the perspective of their own learning preferences: „I'm a visual / tactile student ... you have to show me.” Video technology was preferred because „it's the way I've learned the best. Video shows help me understand better because I have the visual learning style.” The study also revealed that students wanted to engage in clear, well-organized activities

that matched their learning preferences (eg auditory, visual, kinesthetic) (Hall & Villareal, 2015, p. 73). The results of other researches reveal that students use learning strategies based on different learning styles with ultimate results irrespective of the means used (Shih C. et al., 1998, p. 364).

Keirsey and Bates have made a classification of four main learning styles: feeling / perception (SP), feeling / appreciation (SA), intuition / thinking (IG) and intuition / feeling. People with SP style need physical involvement or „tactile” approach in the learning process. He or she learns from media presentations and likes entertainment. People with SA style needs a structured presentation and are based on clear instructions. They do not feel the need for small groups to discuss or have activities. They prefer instructions designed by the teacher. People with IG style like sharing ideas and like to develop their own ideas. Students belonging to this group tend to independence with a predilection for the applied sciences. They feel comfortable with a logical, didactic presentation of the material, and are the followers of self-denial. People with IS style prefer to learn through group / team work and discussion and like to receive feedback (Keirsey D., Bates M., 1984, pp. 121-128). James and Gardner (1995) suggested that for students who have a more independent style, learning will be more effective. People with IS style have the desire to communicate in a personal way with others. They are conversational amateurs with personal feedback, like interaction and engagement in groups. They learn from the discussion method, learn effectively in small groups as well as from courses where the tutor answers questions and accepts the ideas of class members (James & Gardner, 1995, pp. 28-29), (Neuhauser C., 2002, p. 102). Using a customized, individualized learning rhythm is one of the forms of adapting to the multiple individual differences found in a typical group of learners.” (Rosca et al., 2002, p. 9). According to some studies, about 60-65% of the

population learns by visual style (Deza & Deza, 2009, p. 526), about 23-30% are auditory impaired (Deza & Silverman, p. 9), approximately 5% tactile (Deza & Deza, 2009, p. 526) and about 45% use both visual and auditory (Silverman, p. 9).

Also, from the perspective of how to receive information, there is an implicit link between the learning styles or personalized styles and the way that student learns. Students with the predominantly visual style will mostly search for pictures, video files, animations, and implicitly will accuse their absence. Students with predominantly auditory style will want to listen to recordings with pleasant, rhythmic, melodious voice, and especially „empathetic” after their expression. Students with kinesthetic style will want to see the new practical implications of the things they learn, and therefore will want to test and practice what is proposed for learning, and „Combining the influence of goals with knowledge of performance can substantially enhance motivation „(Bandura, 1997, p. 128) in any form of education chosen. There is, of course, the danger of labeling students from their own colleagues and from teachers. Once the tag is placed, it also begins reporting or self-reporting according to the labeled style: „I have discovered that I have a kinesthetic style to learn rather than auditory. So what's the point of reading a book or listening to someone?” (Coffield F. et al., 2004, p. 137).

## **2. Methodology**

### **Objectives**

The aim of the research was to investigate the VARK model at the students of the Pedagogy of Primary and Preschool Education. The research has been undertaken over all three years of study.

### **Hypotheses**

The following assumptions have been proposed and assumed:

1. Assume that students use the four styles of learning in an equal way;
2. We estimate that in the learning strategies most students are multimodal;
3. We admit that the distribution of students on the four styles is random;
4. We assume that there are differences in the use of VARK styles between the group already holding a license and the group that does not hold;
5. We assume that there are differences between the three studies of the predominant use of the four learning styles.

### **Variables**

The independent variables were: the place of origin, the year of study, the possession of a license regardless of the field and age.

### **Methods**

The method consisted in the online application of the VARK questionnaire with the 16 items and the subsequent processing of the data obtained with non-parametric tests.

The VARK model. Within this model, four learning styles have been proposed taking into account the receptors involved mainly: visual, auditory, kinesthetic, and written reading. The main hypothesis of this model is that the material to go in for teaching must be thought and drafted in such a way as to address as many sensory ways of perceiving information. Thus, the authors of this model (Fleming and Mills) identified four main learning styles: visually having preferences for graphical exposures, tables, schemes as verbal representations instead of the multitude of words; auditory style is characterized by preference for hearing information in the form of lectures, audio recordings, conversations or exchange of views; reading and writing style characterizes people who prefer information in written form



(books, textbooks, articles) and for good reception they use notes or minutes in various forms; kinesthetic prefer examples of taught materials to see connections with practical reality and have a predilection for experiments (Prithishkumar & Michael, 2014, p. 184), (Fleming, Suggestions VACK).

## **Tools**

**VARK Questionnaire** This questionnaire model targets the perceptual / sensory level, was developed by Neil D. Fleming and Colleen Mills in 1992 and is also known under the acronym VARK (visual, auditory, read / write, kinesthetic) or VACK (visual, auditory, reading / writing, kinesthetic). The authors (Fleming & Mills, 1992), (Fleming, 2012, pp. 1-10) identify 4 learning styles based on the following types of sensory preferences: visual, auditory, reading-writing and kinesthetic. A fifth mode, multimodal, is based on the combination of at least two preferences. Multimodal style characterizes 50-70% of the population (Bernat, 2003, p. 218). According to the same author, the owners of this learning style can easily adapt to the learning preferences of a wide range of subjects, but they have difficulties when it comes to personal information assimilation. They need to present the information as complexly as possible. The questionnaire (<http://vark-learn.com/>), (Bernat, 2003, pp. 217-222), ([vark-learn.com](http://vark-learn.com)) consists of 16 questions with four variants of answer for each question. Each answer to each question corresponds to one of the four styles mentioned. Then the score is made and the style that has the highest score is the preferred way of learning. The higher is the total, the stronger is the preference for that learning mode. If scores are relatively equal to two or more sections / styles, then it means that the subject has several learning ways. If the scores are relatively equal to all four sections, it shows that the subject learns multimodal with preferences to the first two ways that have a higher score.

Students often have a mixture of learning styles. However, when they understand their preferred learning style, they can choose the types of learning that help them the most. In addition, they are more aware of their own chances of being active in the learning process. By providing multi-sensory experiences, tutors can help students better remember the concepts learned and thus improve their learning (Konttinen & Moilanen, 2015, p. 31).

Finally, the data obtained was processed in SPSS.

### **Population**

There was a total of 44 students from all three years of study. The exact distribution per year was as follows: 6 students in year 1, 21 students in year 2 and 16 students in the year 3. As a medium of origin, there were 18 urban (41.9%) and 25 rural (58.1%). There were 25 (58.1%) of students with no license title and 17 with license title (39.5%) (one person did not answer this question) in terms of holding a license (regardless of domain). In age categories, the situation was the following: 19-22 years (32.6%) 14 students; 23-30 years (18.6%) 8 students; 31-40 years (25.6%) 11 students and over 41 years (23.3%) 10 students.

### **3. Results**

Students often have a mixture of learning styles. However, when they understand their preferred learning style, they can choose the types of learning that help them the most. In addition, they are more aware of their own chances of being active in the learning process. By providing multi-sensory experiences, tutors can help students better remember the concepts learned and thus improve their learning (Konttinen & Moilanen, 2015, p. 31).

The distribution of media in the VARK questionnaire creates a slight depreciation of the Visual style (with an average of 4.40) compared to Auditory style (6.53), Reading-writing (6.86) and Kinesthetic (6.81). Figure 2.5 summarizes the results of the media

for the four styles obtained from the SPSS histogram and at the same time the students' preferences for the Auditory, Read-Write and Kinesthetic styles are visible.

Distributions related to learning strategies take into account the fact that between the first two scores the difference is less than or equal to two points (Bernat, 2003, p. 222). The strategies related to this point indicate that 17 (39.5%) students are unimodal, 9 (20.9%) are bimodal, 13 (30.2%) are trimodal and 4 (9.3%) are quadrimodal (Figure 2). These results are similar to those obtained in other universities (Prithishkumar & Michael, 2014), (Moayyeri H., 2015), where the predominance of students using multimodal strategies amounts to 87%.

The descriptive analysis revealed that Auditory's first-grade scores varied between 2 and 13 points with an average of 6.53 points and a median score of 6 points. Kinesthetic style varies between 1 and 13 scores with an average of 6.81 and a median score of 7 points. In the Read / write style, scores range from 1 to 13 with an average of 6.86 points and a median score of 6 points. For the Visual style, students achieved scores ranging from 0 to 13 with an average of 4.40 and the median was situated to 4 points (Figure 1).

The Runs test, which divides the records into two categories with values greater than the dichotomizing point and with values lower than the dichotomizing point applied to the mean and median, had the following median values: Visual ( $Z = -1.088$ ), Auditory ( $Z = -1.541$ ), Read / Write ( $Z = .135$ ) and Kinesthetic ( $Z = -1.37$ ). For average, the values were: Visual ( $Z = -0.988$ ), Auditory ( $Z = -0.771$ ), Read / Write ( $Z = -0.614$ ) and Kinesthetic ( $Z = -1.37$ ). Consequently, we accept the H1 hypothesis stating that the values within the variables are random.

As ordinal variables, Kendall's tau-b correlation coefficient was calculated, where negative values meant an inversely proportional relationship between the variable levels and the presence of

positive values indicated a directly proportional relationship. Visual style correlates positively with the Read / Write style ( $\tau\text{-}b = 0.285$ ,  $p = 0.013$ ) and the Kinesthetic style ( $\tau\text{-}b = 0.318$ ,  $p = 0.006$ ). But in both cases, the intensities of these correlations are weak. In the same correlation test, the Auditory style correlates positively with the Read / Write style ( $\tau\text{-}b = 0.451$ ,  $p = 0.001$ ) and the Kinesthetic style ( $\tau\text{-}b = 0.234$ ,  $p = 0.046$ ). In the first case the correlation is of medium intensity and in the second case the intensity is weak.

The non-parametric Chi-Square test, which highlights how a certain statistical distribution is consistent with a normal distribution or the consistency of an empirical model with a theoretically equiprobable model, revealed that 3 styles show statistically significant differences. Visual Style  $\chi^2 = 28.047$ ,  $df = 12$ ,  $p = 0.005$ ; Auditory style  $\chi^2 = 31.442$ ,  $df = 10$ ,  $p = 0.001$ ; Kinesthetic style  $\chi^2 = 21.209$ ,  $df = 10$ ,  $p = 0.020$ . Student distribution based on learning strategies (unimodal, bimodal, trimodal and quadrimodal) showed significant statistical trends too ( $\chi^2 = 8.628$ ,  $df = 3$ ,  $p = 0.035$ ). These points mean that students do not have an equidistant distribution to the styles mentioned or modal strategies.

To continue with group analysis, nonparametric tests were still preferred due to the lower number of participants per group.

The U Mann-Whitney test for two independent groups reported on the background did not return any statistical significance for the four styles and the four strategies. Hence, the ranks of the two groups of students are roughly equal and the fact that students from urban and rural areas are quite homogeneous. From the perspective of having a license already (regardless of domain), the same test revealed that there is a statistically significant difference in visual style ( $U = -2.315$ ,  $p = 0.021$ ). The group that already owns a license has an average rank of 16.24 and the group that does not hold any license has an average rank of 25.08. The conclusion

would be that the unlicensed group is more likely to use this learning style.

The Kruskal-Wallis H test for independent groups in three years of study revealed the presence of statistical significance in the Auditory style ( $\chi^2 = 8.122$ ,  $p = 0.017$ ) between the 1<sup>st</sup> grade (9.92) and the 2<sup>nd</sup> grade (26.1). Thus, we can state with 95% confidence that the students of the second year use the learning style assimilated by Auditory more than the students of the first year. In the Read / Write style, the test revealed a value close to the statistical significance ( $\chi^2 = 5.946$ ,  $p = 0.051$ ) between the 1<sup>st</sup> rank (13.17) and the 2<sup>nd</sup> year average (26.24). Thus, we can assert with a 94% confidence that the students of the 2<sup>nd</sup> year use the Read / Write learning style more than the students of first year.

The same age-related test did not reveal any statistically significant differences. There was only one case close to statistical significance, namely the visual style ( $\chi^2 = 7.159$ ,  $p = 0.067$ ) between the average age ranges of the age group 31-40 years (15.86) and the average of the ranks of the group over 41 years (29).

#### **4. Discussions**

Researchers Klement, Dostal, and Marešová (Klement, Dostál, & Marešová, 2013) in the study titled Elements on Materials used in e-learning with applicability to learning styles, conducted on a batch of 354 students at the Psychology specialty of the Faculty of Education from Palacký University Olomouc highlighted that 11% of subjects prefer visual learning, 12.7% auditory, 25.4% written / read and 50.8% kinesthetic. A study by Jessica Utts (Utts, 2008) at Ohio State University, for various specializations in the social sphere, concluded that 42% of students prefer visual learning, 6% auditory style, 44% written / read style and 8% kinesthetic style. Visual learning and reading / writing styles are preferred by students because they are more active and more sensitive than

other subjects. The same repetitive procedure for teachers and management has shown that they learn intuitively and reflectively, so that auditory and written / read styles have higher percentages only in the student's cases. In a study by Hessam Moayyeri (Moayyeri H., 2015, p. 137), on a batch of 360 Iranian students from various specialties in the social sphere, it evidenced that 80% prefer the style of writing / read. Similarly, to students from the social specialization responded subjects from other fields, such as Persian literature, foreign languages, etc. All interviewees focused on memorizing and comprehending texts in knowledge accumulation.

A study by Aylin Tekiner (Tekiner, 2005, pp. 79-86) at the Technical University of the Middle East in Turkey highlights the importance of the correlation between VARK learning types and Gardner type intelligence. The results of the study showed that the preferred learning style was kinesthetic with 27.9% and an average score of 38.27, followed by tactile (written / read) by 18.2% and an average score of 36.86, visual with 16.9% and an average score of 35.69 and auditory by 11% and an average score of 35.98. Individual learning is preferred, with a value of 18.8% and an average score of 35.67, while group learning has only 7.1% and an average score of 30.74.

A study conducted by Horton et al. a group of 141 students from Psychology highlighted that the students in this study were multimodal with a small gender difference (female students had a slightly higher percentage of Read / Write learning) (Horton, Wiederman, & Saint, 2012).

Similar results have been obtained by current research.

## **5. Conclusions**

Auditory, Read-Write and Kinesthetic styles are predominant to students and roughly equal proportions. Visual Style obtained an

average of two-thirds after the first three styles. In learning strategies 17 (39.5) students are unimodal and 27 (60.5) are multimodal. The Runs test did not reveal the presence of any statistical significance. In the Kendall's tau-b correlation test, the Visual style correlates positively with the Read / Write style and the Kinesthetic style. Auditory style correlates positively with the Read / Write style and Kinesthetic style. In three cases the correlation is of poor intensity and in one of the cases the correlation was of medium intensity.

The non-parametric Chi-Square test revealed that 3 styles show statistically significant differences: Visual, Auditory and Kinesthetic. Student distribution based on learning strategies also showed significant statistical trends.

The U Mann-Whitney test revealed that there is a statistically significant difference in Visual style between the group that already holds a license and the group that does not have any license.

The Kruskal-Wallis H test revealed the presence of statistical significance in the Auditory style between the 1<sup>st</sup> grade and the 2<sup>nd</sup> grade. The age groups did not reveal statistically significant differences.

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## Tables, figures and appendices

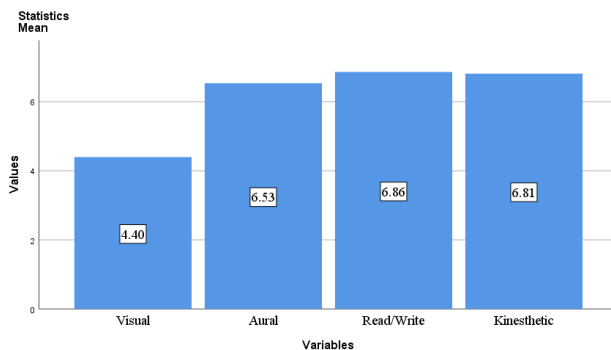


Fig. 1. Media distribution - VARK questionnaire

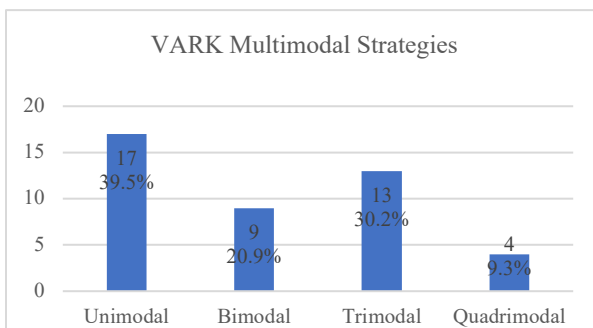


Fig. 2. Distribution related to learning strategies - VARK model