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IMPLEMENTATION OF PERSON-CENTERED APPROACH IN PRE-SERVICE MATHEMATICIANS' TRAINING BY USING VARK MODEL OF LEARNING

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Abstract: The author's practices in applying person-centered lab works are considered in this paper according to students' learning style preferences. Some samples of higher mathematics labs are worked out. The author uses VARK model of learning. The acronym VARK stands for the four VARK modalities – visual, auditory, read/write, and kinesthetic – sensory modalities that are used for learning information. The fragment of the lab work "Golden ratio in cinematography and photography" for visual and kinesthetic learners is included in the paper.

Keywords: VARK modalities, learning styles, visual learning, auditory learning, reading/writing learning, kinesthetic learning, humanization in education, person-centered approach, non-directive teaching, creativity, self-confidence, laboratory work, analytical geometry.

1. INTRODUCTION

It is necessary to have a specialist for modern society who is able to make unconventional decisions, to act individually and creatively. Creativity begins where an independent search of principles, behavior and ways of activity take place. "Creativity is not sure to manifest itself in playing music, versification or painting. It is just a special world-view, a peculiar way of interaction with a reality" [5]. According to some famous psychologists, creativity is based on personality independence and it is highest degree of intellectual personality development.

Today a creative approach to solving some problems becomes a necessary professional quality of each specialist, for the teacher in the first place. So, it is necessary to reject a directive teaching, to improve the ideas of humanization in education and person-centered approach.

Scientists think that a person-centered teaching is not just taking into account personal features of a student, but it is the other organization of teaching conditions methodology which expects students' own personal activity or requires of their subjective experience as well.

The term "person-centered" was introduced into practice by influential American psychologist Carl Rogers. He underlined in his paper "On Becoming a Person: A Therapist's View of Psychotherapy": "That it has the capacity to move people, to make them freer, more open-mined, more flexible, I have no doubt. I myself witnessed the power of this method. I believe that non-directive teaching has profound implications which even those who accept this point of view cannot at

present fully fathom. Its importance, I believe, goes beyond the classroom and extends to every area where human beings communicate and try to live with one another" [8].

Carl Rogers mentioned while speaking about personality-centered approach: "More specifically, as a classroom methodology, it warrants the widest discussion, inquiry and experimentation. It has the possibility of opening up a whole new dimension of thinking, fresh and original, for in its approach, in its practice, in its philosophy it differs so fundamentally from the old" [8].

Also, taking into consideration the uniqueness of each teacher and student, it is necessary to create a pedagogical environment that would provide for their positive, versatile, and adequate self-realization and would be a foundation for their subsequent prospects of development [2].

We have a long-standing experience of the implementing person-centered education ideas for enhancing the quality of higher mathematics learning. In 2010 our research group made the decision to study, develop and embed a person-centered educational model into several mathematical courses taking into account students' learning style. The term learning style is used to describe almost any attribute or characteristic of learning. Technically the term refers to all the components that might affect a person's preferences for learning [1].

There are many different ways of categorizing learning styles, but Neil Fleming's VARK model [2] is one of the most popular. VARK learning style model is learning style that has been modified from VAK model, to VARK learning style by Fleming in 2006. This learning style is modified by classifying students to four different modes. The modes based on different senses, namely visual, aural, reading, and kinesthetic, and the name of the model itself, originated from those senses prefix letters (V, A, R, and K) (fig.1).



Figure 1. VARK model of learning styles (by Neil Fleming)

Based on Fleming (2006), aural mode students tend to attain information by discussion and listening [2]. For reading mode, these students have the ability to accept and interpret printed information. For visual mode, the students are more

prone to accept learning through interpreting charts, graph figures, and pictures. While kinesthetic mode leans more towards accepting learning based on behavior such as touch, feel, see, and listen [6].

There are seldom instances where one mode is used or is sufficient, so that is why there are two-part, three-part, and four-part VARK preferences. Those who do not have a standout mode with one preference score well above other scores are defined as multimodal [11].

2. REALIZATION OF PERSON-CENTERED APPROACH IDEAS IN TEACHING HIGHER MATHEMATICS

In order to determine students' learning style preferences, first year students of State Tax University (64 students) were asked to respond the VARK questionnaire (version 8.02) [11], which was translated into Ukrainian by the author. Using the results of the VARK questionnaire, students were classified as unimodal or multimodal and according to the first preferred sensory modality used for learning as V, A, R, or K learners.

We obtained interesting results. The most of students (66%) were multimodal in their learning preference, and 22 students (34%) were unimodal. The highest unimodal preference was visual and kinesthetic – 17% and 8%. Only 2 students were auditory learners and 4 students used reading/writing as their best way for learning.

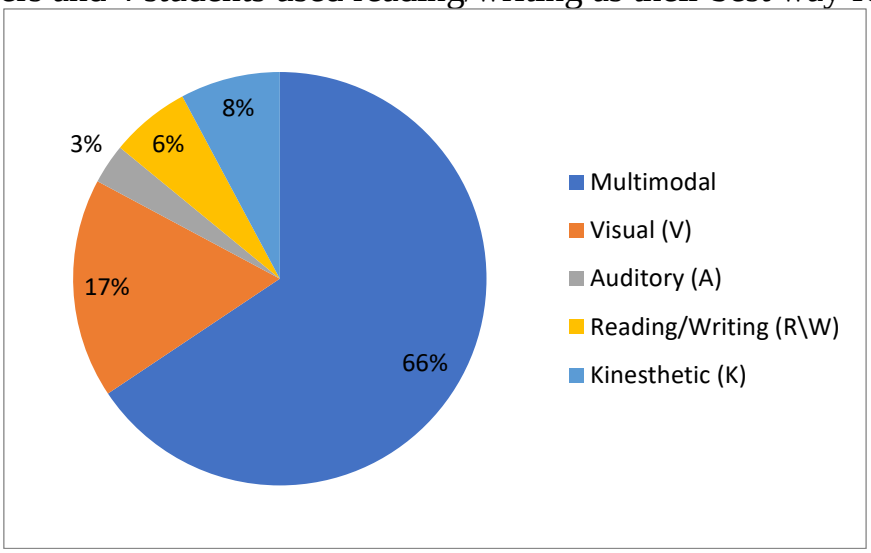


Figure 2. Results of VARK questionnaire

Prithishkumar & Michael (2014) underline, that multiple modalities of information presentation are necessary to keep the attention and motivation of our students requiring a shift from the traditional large-group teacher-centered lecture method to an interactive, student-centered multimodal approach [7].

We consider that realization of person-centered approach ideas in teaching higher mathematics according to their learning styles is possible by means of game frame, special constructed exercise books and some communicative technologies [3].

Therefore, students are proposed to carry out an experiment while studying one or another topic of higher mathematics at the lab work. It might be approached by means of observations, comparisons, measuring, table compiling, graph construction,

math formulas analysis, etc. for the purpose of mastering knowledge or finding new facts, detailed logical demonstrations and practical applications [4].

Student's activity during the lab works presupposes the following functions:

- organization one's own study activity taking into account personal features;
- increasing the motivation of study;
- development of personal characteristics, such as: purposefulness, persistence, self-confidence, cognitive skills, self-control etc;
- feedback and reflection.

The curriculum of Higher and Applied Mathematics, studied by the first-year students of State Tax University provides some content module, dedicated to the different types of geometric transformations and symmetry [4].

It should be noted that the cognitive activity and creativity of students plays an important role in their future teaching process, as well as the ability of a teacher to channel this activity [10].

The role of the student in person-centered education is learning to take responsibility for their own personal development, with interest in the development of social, personal and problem-solving skills, and for learning to learn, learning from mistakes, willing to contribute to a cooperative and tolerant school ethos and able to learn how to relate to herself/himself and others with respect, empathy and congruence [13].

The fragment of the lab work **"Golden ratio in cinematography and photography"** out of that content module is given in an example to follow. We offer it for visual and kinesthetic learners.

The objective of the lab work: to calculate and use golden ratio in human practice, in cinema and photography in particular; aesthetic development of the person.



Instruction (for students)

Theoretical tip

***The golden ratio**, also known as the **golden number**, golden proportion, or the divine proportion, is a ratio between two numbers that equals approximately* $\mathbf{1,618.}$ *Usually written as the Greek letter* φ*, it is strongly associated with the **Fibonacci sequence**, a series of numbers where in each number is added to the last. The Fibonacci numbers are:* $0, 1, 1, 2, 3, 5, 8, 13, 21$*, and so on, with the ratio of each number and the previous number gradually approaching* $\boldsymbol{\varphi = 1,618}$.

Many artists and designers throughout history have adopted this mathematical equation as a means of creating balance, order and symmetry [9]. Some detail information about using golden ratio in art you can find here (QR code):

In photography*:*

One more example of golden ratio application in photography is main elements positioning in the special points of the frame, so-called visual centers. There are just four such points positioned at a distance of 3/8 and 5/8 from corresponding frame edges. One always focuses its attention on golden ratio points irrespectively of picture size (fig. 3). Example is given at figure 4:

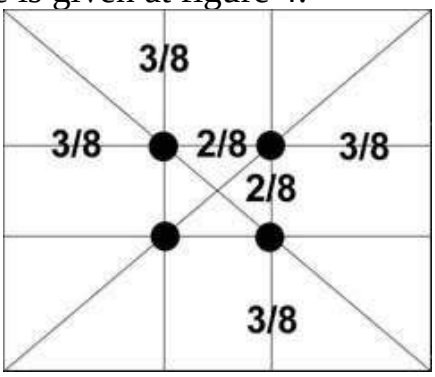


Figure 3. Location of the human visual centers.



Figure 4. Photo, taking according to the golden ratio rule

It is an ideal layout building instance. Sky line goes at the golden ratio horizontal line and both windmills are located at vertical lines. As a result, there is an immensely harmonious photo.

Students are proposed to analyze their own or borrowed photos and do the following exercises:

1) Do photos meet the golden ratio rule? Give your proof of answers.
2) Make several photos whether following the golden ratio rule (fig. 5 left) or not (fig. 3 right). Make an analysis of such image impressions. Do you agree that “golden ratio photos” are more pleasant to look at?



Figure 5. Student Photograph for the lab work “Golden ratio in cinema and photography”.

The left photo was taken by Yana Mudranova, the right one by Uriy Gritcenko

Also we offer students to develop a similar lab work on the other topics of the discipline, training for future professional activities.

After having done this lab work students are asked to fill in the table (tick the right answer). We also used electronic survey designed with applying the tool Google Form (fig. 6).

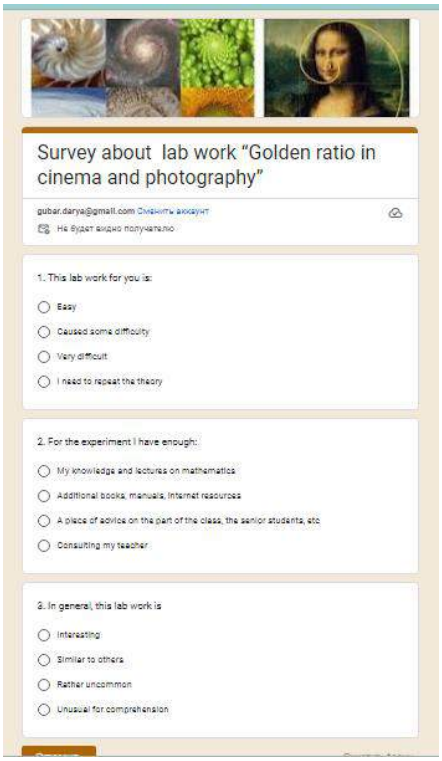


Figure 6. Google Form of Survey of lab work "Golden ratio in cinemagraphy and photography"

Students can give out their comments or suggestions in the table given above. It makes possible for the teacher to evaluate students` results adequately and improve them on the lab work.

It should be mentioned that certain technical complications, such as lack of digital cameras, may occur during work execution. To prevent that, we made up our mind to unite the students into groups of 2-3 people, each group having access to their digital camera. In addition, results showed that the uniting students into groups at the lab work has a few positive aspects:

- students' attitude to the experiment is more honest;
- increasing their cognitive activity and creative independence;
- spending less time on the concepts and skills formation;
- differential and individual approach to students taking into account their pace of work;
- increasing the amount and depth of understanding educational material;
- students independently distribute responsibilities among themselves, so everyone plays some role in the particular social group;
- students fell more confident in class, they get the pleasure of learning.

3. CONCLUSIONS

The author's experience proves that, the given approach to lab works has a number of benefits both for the students and teachers. First, according to Gregory Warrington (2009), by moving the source pictures from the textbook to a physical location that exists in their everyday world, it connects the discipline to their lives [12]. They can share their own experience with their friends, consolidating their knowledge and skills.

Second, for students who like photography and cinema that lab work is a welcome break from pushing around abstract terms on a piece of paper. They work with a double interest, help other students in their group and prepare additional reports on interesting information. Students can also use their experience to directly look for golden ratio in those objects that play an important role in their life – say, their sports equipment or musical instrument.

Based on the results of our experience we can say, that modernization of contemporary education aimed at overall development of intellectual potential and creative abilities of students cannot be fully fulfilled without such a phenomenon as a person-centered approach. And in hands of a creative teacher, it becomes a reliable instrument in development of a young person, his/her abilities and capabilities, creative future professional activities.

To enhance the student learning experience, it is essential to identify their preferred learning styles and incorporate innovative, multimodal teaching strategies. This approach creates a more engaging, interactive, and student-centered classroom environment.

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ЗМІШАНЕ НАВЧАННЯ В УМОВАХ ВОЄННОГО СТАНУ: ДО ВИЗНАЧЕННЯ ТЕРМІНІВ ТА ПОНЯТЬ

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В сучасному світі пандемія COVID-19 сприяла активному запровадженню дистанційного навчання в закладах освіти всіх рівнів та форм власності. Однак із початком повномасштабного наступу та розгортанням військових дій на території України з 24 лютого 2022 р. на території України перед закладами освіти постали нові завдання.

Серед них на першому місці опинилися: психологічна підтримка здобувачів освіти, організація навчального процесу з метою отримання знань здобувачами та відволікання їх від реальності бойових дій, особливо на територіях наближених до поля бойових дій. Серед освітніх технологій для реалізації означеної мети виходять технології організації змішаного навчання.

Упровадженню моделі змішаного навчання в системі освіти присвячені праці таких авторів, як Є. Желнова, О. Кривонос, В. Кухаренко, М. Нікітіна, А.Стрюк, Ю. Триус, Г. Чередніченко, Л. Шапран та інших. До питань змішаного навчання зверталися також С. Грехем, С. Моебс, С. Вейбелзах, Д. Пейнтер, Р. Сченк. Проте варто зазначити, що теорія застосування змішаного навчання в закладах освіти на території України потребує подальших досліджень з огляду на реалії сьогодення.

Перші згадки про комбіноване або змішане навчання (blended learning) за кордоном відносяться до 1995 р.. В Україні про нього почали активно говорити у 2006 р. після публікації «Довідника змішаного навчання».

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