

PEDAGOGY

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Continuing education and learning styles of the physics teacher

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Abstract. This Report presents the results from studying the learning styles of 160 physics teachers in the Republic of Bulgaria, which study is the basis for the creation of programs for continuing education for the physics teachers. An invariant model of education using electronic learning environment was described.

Keywords: *continuing education of physics teachers, learning style, electronic learning environment*

Introduction

The information society in which we live today, is ever more demanding of the teachers. It is an established fact that the modern teacher is very different from the one from twenty, thirty, or forty years ago. In the era of ever increasing flow of information the teacher must possess, apart from communicative, constructive, organizational, and Gnostic competences [6], also competences involving skills: for intercultural interaction; for using modern technologies; for self-education and self-development. The contemporary digital competence of the teacher includes also a new dimension – the ability to plan, organize, manage and assess the educational-cognitive activities of the students in electronic learning environments. Therefore the importance of continuing education of the various generations of teachers is a key factor for the development and improvement of the new competences.

Brief overview of the publications on this topic

Continuing education

This report adopts the definition of lifelong learning provided in the Memorandum on Lifelong Learning of the European Commission, mainly: «all purposeful learning activity, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence, » [1]. The continuing education of the teachers is also interpreted in this sense, which in numerous reports is brought together under the name «ongoing professional development».

Learning style

Various Bulgarian authors are offering a chronology of learning styles [7, 9, 10]. There are many definitions of learning style. This report adopts the widely spread definition of NASSP (National Association of Secondary School Principals): «learning styles are characteristic cognitive, affective and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment.» [2].

The experiential learning model of D. Kolb is popular. In the four stages of learning D. Kolb defines four learning styles– diverging, assimilating, converging and accommodating. During training of physics teachers their learning style was studied based on this model called furthermore cyclic or learning style in and through experience. 160 physics teachers were studied with the aim to record the trainees' preference for the manner of receiving information and its processing, which is of importance for the creation of the work teams during the learning process in continuing education courses. The specific characteristics of each one of the four learning styles are the following [10, p. 101-103]:

- Divergent style – a combination between the concrete-experiential and the reflective-observant type and it reflects the question «Why?». The trainees with such style of learning prefer the information presented to be well-systemized and well-arranged. Abilities to contemplate concrete situations;
- Assimilative style – it combines the abstract-conceptual reflective-observational type and reflects the question «What?». Preference for the exact and logically presented information, and not for its practical value;

- Convergent style – a combination between the abstract-experiential and the active-experiential type and reflects the question «How?». Prone to the practical application of ideas. They learn based on trial and error;
- Accomodative style – it combines the concrete-practical and active-experiential style of learning and reflects the question «What will happen if I do this?». Skills to seek out the significant and important in the experiment. They like challenges, abilities to organize and cope with complicated problems.

Learning environment

Learning environment is understood to mean a natural and artificially created socio-cultural ambient around the learner including various types of resources and educational content capable of providing his/ her productive activity [5, p. 188]. The following attempt to form a definition sounds even clearer: «the tangible conditions and human relations leading or not to the imposition of a creative, motivating microclimate» [3]. The interaction trainee – environment encompasses various channels, each of which presupposing a particular kind of interaction: the sensory organs and their language of interaction with the world; the communicative interactions, directed towards mental exercise performed by the trainee; the extra sensitive interaction with the world – empathy, intuition, through which knowledge is acquired; the language of communication of the trainee with him/ herself [5, p. 191-192].

Electronic learning environment

What is specific for this environment is the strong binding of numerous internet users who are active participants in various processes and interactions: they purposefully create and contribute towards the value of the particular product/resource; openness and freedom of construction and use of various resources; intensity of experience at work [8]. These kinds of environments basically have four functions – storage, communication, evaluation and joint work activity. Files, folders, web pages, portfolios, links and other may be stored. Communication usually takes place through the so-called Web-instruments of the environment, like forums and chats, while the joint activity is organized and carried out through blogs, wiki, social networks and other. Evaluation takes place by means of multiple-choice tests, questionnaires, course papers, by voting, for example on group-performed work, and there is also the option of self-assessment. A specific and important peculiarity is the asynchronous and synchronous communication carried out during the training.

Purpose

To study the style of learning of physics teachers in order to create and justify an invariant model of continuing education of the physics teachers in electronic learning environment.

Materials and Methods

The technology of studying the learning styles of 160 physics teachers was described in other publications by the author [4]. It is based on a questionnaire, which the surveyed person fills out, where the answers are coded in a particular way, and based on particular instructions for processing the results, the individual learning style is determined.

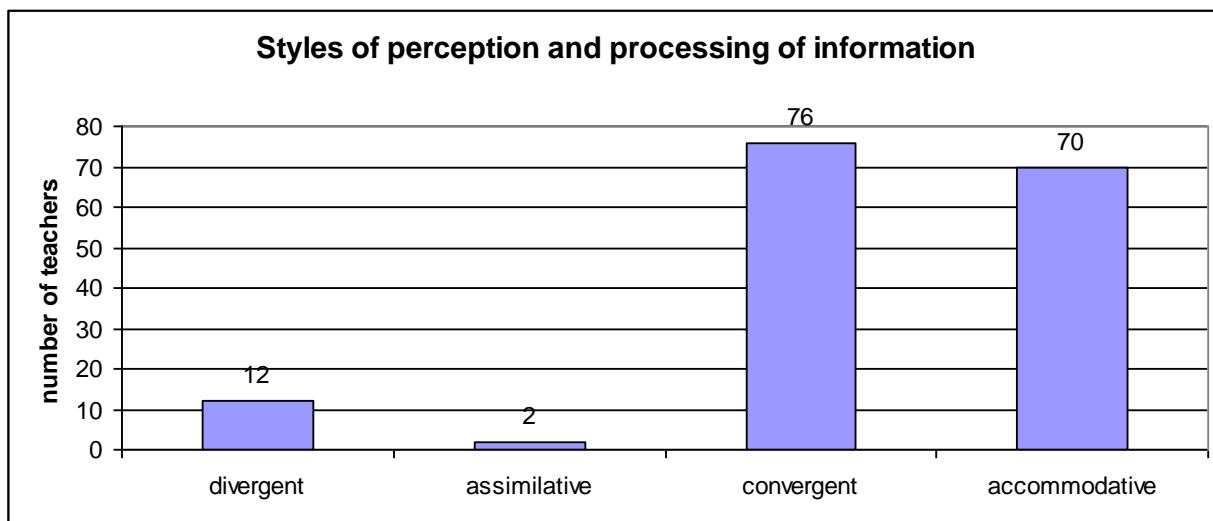


Fig. 1. Graphic representation of the results from studying the learning style of 160 physics teachers

Results and their analysis

The results from the survey showed the propensity of the trainees towards the manner of receiving the information and its processing – of the accommodative types are 44% of the teachers surveyed, divergent – 7,5%, convergent – 47,5%, assimilative – 1%. These are results supporting the thesis that it is essential for the teacher to have organizational and leadership skills, to demonstrate abilities to define and resolve problems, to take risks and apply his/ her ideas in practice. These features of the professional profile of the teachers were confirmed by 91,5% (146 teachers) of the studied group of physics teachers.

Continuing education programs were created based on this study where the trainings take place in various types of learning environments – in electronic learning environment, in a real learning environment and in a mixed type of learning environment.

In order to create a learning environment stimulating the achievement of excellent results, the teacher actually plans and organizes the so called learning design, which is built on scientifically based technology for problem solving related to the artful structuring of the learning process and involves the following elements: purpose; process; flexible approaches aiming at adapting the trainee; possible methods; expected activities; end products of the activity; human self-reflection; adjustment. When using electronic learning environment it is important to decide which of the various possibilities and Web instruments, like blogs, forums, video clips (YouTube) wiki, ticks in the social networks, and other to use. The established features of the professional profile of the surveyed 160 physics teachers show a dominant convergent and accommodative learning style. Typically the convergent type of teacher is able to resolve problems, is practical, likes to experiment, to work with practical applications, and independently [11]. Therefore when creating educational environment it is proper to offer practical tasks and simulations. The accommodative type of teacher normally relies on intuition, uses the analyses of other people, prefers practical experience accumulated while working in a group [11]. This means that in the learning environment methods of teaching, which are dedicated to group organization of the activity – discussion, dialogue, discourse, resolving cases in a group, etc., are planned and organized.

Invariant model of training physics teachers in electronic learning environment

1. The purpose of the trainings in electronic educational environment is to develop and improve the skill of using electronic platforms in the real-life physics educational process in the secondary schools. The teachers experience everything that happens during their training from the point of view of a trainee, with the self-reflexive getting to know of their own pedagogical practice.
2. The process of training undergoes preliminary preparation and planning of the resources and the suitable Web instruments, which are in line with the learning styles of the teachers. The organization itself of the learning process is the following – within the course, which is one month or less long, meetings are organized in the virtual classroom and a discussion takes place there of the expected results from the training, the activities that will be carried out, as well as directives for working with the various Web instruments. In this case the communication is synchronous. The learning-cognitive activity itself, depending on whether designed as group or as independent work, is also carried out in the asynchronous mode through forums and electronic mail, or in synchronous mode through chat. Deadlines were set out for creating the end products of the activity.
3. The approaches relied on for the effective training in electronic learning environment, are the technological and the situational approach. The electronic platform is a strictly organized and well-arranged system with scheduled activities and capable of positioning the trainee in concrete situations.
4. Methods of training – discussion in the virtual classroom and in the forums; resolving cases where the result is published in a blog; working on a project by using videoclips from You Tube and other sources of information, the result being creating scientific text in Wiki; designing one's own project of the training event, in which an electronic platform is used.
5. Expected activities – studying, analysis and discussion of information; using various Web instruments; design and creation of various kinds of products, having well-argued presentation and evaluation.

6. End products of the activity – knowledge and skills on how to use the electronic platform in the physics learning process.
7. Self-reflection – the evaluation of the completed training of teachers by using electronic platform includes all stages of the planning, preparation, execution and end results from the training. One may note that here the preparation of the trainer is much lengthier than during the training process in an auditorium, or the so called interaction «face-to-face». The difficulties the teachers encounter during their training fall into the following groups:
 - A) technological – lack of experience with working in a virtual classroom and using various kinds of Web instruments.
 - B) constructive – related to designing the training events and more specifically regarding their technical aspect – how to input the defined parameters of the Web instruments, which the teachers want to use.From the methodological point of view the topics, which the teachers select, are interesting and may influence the learning motivation of their students. They have a clear idea of how to read the process of training by using electronic platform.
8. Adjustment – the training in the electronic platform is very interesting and diverting for all participants. What may be done after the completion of each training

course, is linked to a more understandable prior notion of the age-related and individual characteristics of the trainees and according to the specifics of each group to plan and prepare resources adequate to their abilities. A very important element for adjustment is surveying the trainees in order to establish feedback about their attitudes toward the manner of education, any difficulties they encounter, and recommendations they offer to improve the educational design.

Conclusions

The conducted study shows to an adequate degree how important it is for the trainer to know the learning style of his/ her trainees. This advance feedback assists with the planning of the educational design of the courses held in a different learning environment, which on its part will increase the efficiency of the trainings. The established typical characteristics of the learning styles of physics teachers determines how to plan, organize and conduct their learning-cognitive activity during the trainings in electronic learning environment.

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REFERENCES (TRANSLATED AND TRANSLITERATED)

1. A Memorandum on Lifelong Learning, 2000
2. Griggs, S. Learning Styles Counseling //ERIC Digest, 1991
3. Gyurova, V. Interactive methods and motivation of students to learn – in a dialogue with Phil Reyes. – In: The interactive methods of modern education. Blagoevgrad, 2010, p.33–p.41
4. Dimitrova, N. The Research Activity of the Physics Teacher // Sofia: university publication «St. Kliment Ohridski », 2015
5. Hutorskoy, A. Contemporary Didactics //Saint Petersburg: Piter, 2001
6. Zhekova, St. Psychology of the Teacher //Sofia: Narodna Prosveta, 1984
7. Ivanov, I. Styles of knowledge and learning. Thories. Diagnostics. Ethnic and Sexual Variations in Bulgaria // Shumen: university publication «Konstantin Preslavski», 2004
8. Kissimov, V., D. Velev. Methods for Designing Business Information Systems based on Web 2.0 and cloud computing, 2009 <www.unwe.acad.bg/research/br17/5.pdf>
9. Lecheva, G. Learning styles as teaching Competence for diversifying the teacher's strategies // Scientific papers of Russe University, Vol. 48, series 6.2., 2009, p. 54 – P. 59. URL: <http://conf.uni-ruse.bg/bg/docs/cp09/6.2/6.2-9-n.pdf>
10. Mihova, M. Teaching. Learning: theories, styles, models // V. Tarnovo: Astarta, 2002
11. Tuparov, G. and D. Dureva. Electronic Training. Technologies and Models //Blagoevgrad: university publication «N. Rilski», 2008.

Димитрова, Н. И. Непрерывное образование и стиль обучения учителя физики

Аннотация. В статье представлены результаты исследование учебных стилей 160 учителей физики в Болгарии, которые является основой для создания программ непрерывного образования для учителей физики. Описано стационарная модель обучения в электронной учебной среде.

Ключевые слова: непрерывного образования учителей физики, стиль обучения, электронная образовательная среда