Appropriate Learning Tools and Approaches According to the Different Learning Styles and Collaboration Skills of the Students

Donika Valcheva [1] and Margarita Todorova[2]

Abstract – **In this report the authors made an attempt to categorize and defined the most appropriate teaching tools and approaches for students with different learning styles and collaboration skills by using two classifications – learning styles according the human perceptual modalities and learning types depending on the student's collaboration skills.**

Keywords – **E-learning, Learning modalities, Collaboration skills, Learning Tools and approaches**

I. INTRODUCTION

In the traditional classroom form of studying, the teaching is realized in front of a group of students with different learning styles and skills for collaboration. In most of the cases, although the professionalism and the wish of the teachers to work individually with each student separately, the personalization is very low.

The main goal of e-learning nowadays is to personalize the learning process according to the individual skills and learning style of each student. The modern technologies offer grate range of tools and approaches for realizing effective learning process for students with different learning styles and needs.

There are many theories [[1],[13]], which define student learning styles according to different criteria. A lot of research is made in this direction [[1],[2],[3],[4],[6],[7],[8],[9],[9],[11],[12]].

It is obvious that the more theories are taken in consideration when designing a given learning tool the more effective and personalized will be the teaching process.

In this report we made an attempt to categorize and defined the most appropriate teaching tools and approaches for students with different learning styles and needs by using two classifications – learning styles according the human perceptual modalities and learning types depending on the student's collaboration skills.

II. DESCRIPTION OF THE LEARNING MODALITIES

People tend to have a preferred learning, so will learn more effectively if they have access to learning resources that utilize their preferred way of learning. In this report we use three basic modalities to process information to memory: visual (learning by seeing), auditory (learning by hearing), and kinesthetic (learning by doing). Many students are not aware of their preference, which takes them difficult to approach their own learning [[1],[13]].

In tab.1 are discussed some of the main personality characteristics of the learning modalities, according to which the students could be differentiated.

TABLE I
PERSONALITY CHARACTERISTICS OF THE LEARNING MODALITIES

Visual	Auditory	Kinesthetic
- Mind wanders during verbal activities; - Has trouble following or remembering verbal instructions; - Prefers to observe rather than actively participate in group activities; - Likes to read silently; - Is neat and organized; - Pays attention to detail; - Has neat handwriting and is a good speller; - Easily memorizes by seeing pictures and diagrams; - May have a „photographic memory"; - Use highlighters, circle words, underline.	- Is easily distracted; - Quickly looses interest in visual demonstrations; - Enjoys listening activities; - Is active in group activities and discussions; - Prefers reading aloud to silent reading; - Listens to music while studying or doing homework; - Has sloppy handwriting; - Often read to themselves as they study; - Are not afraid to speak in class.	- Taps pencil or foot while thinking, studying, or writing tests; - Enjoys doing experiments; - Uses excessive hand gestures and body language; - Tends not to enjoy reading; - Enjoys hands-on activities; - Enjoys problem-solving; - Is a poor speller; - May have trouble memorizing lists, numbers, etc.; - Easily expresses emotions.

Depending on their preferred learning modality, different teaching techniques have different levels of effectiveness. Effective teaching requires a variety of teaching methods which cover all three learning modalities (tab.2). No matter

[1] Assistant Prof. PhD Donika Valcheva, Faculty of Mathematics and Informatics, St. Cyril and St. Methodius Univeristy, Veliko Tarnovo, Bulgaria, e-mail: donika_valcheva@abv.bg

[2]Prof. Margarita Todorova, Faculty of Mathematics and Informatics, St. Cyril and St. Methodius Univeristy, Veliko Tarnovo, Bulgaria, e-mail: marga_get@abv.bg

what their preference, students should have equal opportunities to learn in a way that is effective for them.

TABLE II
SOME APPROPRIATE TEACHING TECHNIQUES

Visual	Auditory	Kinesthetic
-visual demonstrations, - video lessons, - presentations, - animation, -3Dgraphic applications, - maps, - charts, -graphics, photos, etc.	- audio lessons, - video lessons, - animation with voice instructions, -discussion forums and social networks.	-interactive learning content, - simulations and games, - problem-solving tasks, - experiments.

III. CLASSIFICATION DEPENDING ON THE STUDENT'S COLLABORATION SKILLS

According this classification the learning types (styles) could be defined as cooperative, competitive and individualized learning types [[5]].

An **individualized learning** type indicates a preference for achieving individual goals having no involvement with peers.

The **cooperative learning type** indicates a preference for achieving individual goals while working conjointly with peers.

The **competitive learning type** indicates a preference for learning in competition with others, often achieving individual goals when others fail to achieve their goals.

IV. APPROPRIATE LEARNING APPROACHES AND TOOLS ACCORDING TO THE DIFFERENT LEARNING STYLES AND COLLABORATION SKILLS

In the following table is shown an attempt to summarize and to define the most appropriate learning approaches and tools for the students with different learning modalities and collaboration skills. Combining these two criteria we commonly may categorize these students into the following:

- Individualists with dominating learning by seeing modality;
- Cooperative students with dominating learning by seeing modality;
- Competitive students with dominating learning by seeing modality;
- Individualists with dominating learning by hearing modality;
- Cooperative students with dominating learning by hearing modality;
- Competitive students with dominating learning by hearing modality;
- Individualists with dominating learning by doing modality;
- Cooperative students with dominating learning by doing modality;
- Competitive students with dominating learning by doing modality.

In tab.3 we suggest appropriate tools and approaches for students with different learning modalities and collaboration skills. This is an attempt to summarize and arrange some of the most used tools that offer the modern ICT and to define some good approaches for presenting and offering effective e-learning. The table is not full. It could be improved and more tools and approaches could be added. Also other criteria for defining personal individuality and learning styles could be taken into consideration.

TABLE III
APPROPRIATE TOOLS AND APPROACHES FOR STUDENTS WITH DIFFERENT LEARNING MODALITIES AND COLLABORATION SKILLS.

Modality/ Collaboration Skills	Individualists	Cooperative students	Competitive students
	ICT tools and teaching approaches		
Visual (learning by seeing)	-visual demonstration video lesson; -presentations, animation, 3d graphic applications, maps, charts, graphics, photos, etc. for individual work.	-real time visual demonstration + use of video conversation (or other synchronous communication tool) between the students and the teacher; - presentations, animation, 3d graphic applications, maps, charts, graphics, photos, etc. used as helping tool for virtual discussions and studying together in a team.	-real time visual demonstration + online time testing after the demonstration for obtaining immediate feedback for the rate of absorbing the information by the students; -presentations, animation, 3d graphic applications, maps, charts, graphics, photos, etc. used for virtual brain storming and problem solving.

Audio (learning by hearing)	Audio lessons, video lessons, animation with voice instructions, stored in memory device.	Audio lessons, video lessons, animation with voice instructions, combined with discussion forums and social networks for cooperative work and study.	Audio lessons, video lessons, animation with voice instructions, combined with discussion forums and social networks for providing dispute and nominating the best student in it.
Kinesthetic (learning by doing)	-use of simulators; -playing individual practical games; -doing individual project with real problem-solving tasks.	-real time simulation + use of video conversation (or other synchronous communication tool) between the students and the teacher; -playing practical games + use of video conversation (or other synchronous communication tool) between the students and the teacher; -doing a real project with problem-solving tasks in a team + use of video conversation (or other synchronous communication tool) between the students and the teacher.	-real time simulation with competitive character (with assessment of the results); - competitive virtual practical games; - doing a real project with problem-solving tasks by dividing the students into teams after finishing the project + presentation of the results by use of video conversation (or other synchronous communication tool) between the students and the teacher. At the end assessment of the results.

V. CONCLUSION

One of the reasons that make authors think that this investigation is useful is that one of the most serious problems nowadays in e-learning is the lack of personalization of the teaching and learning process. In the Internet space can be found countless courses in one and the same theme, presented in different way, with different level of usage of multimedia elements, directed to different learning styles, with different duration and complexity. The user has the very difficult task – to find in the ocean of e-learning courses, the most appropriate for his learning style, basic knowledge and skills. This is not always possible, and even when the choice of an appropriate course is a fact, the chance the initial goal (gaining knowledge and skills in a given field) to be reached for a short time is not high.

It is necessary to be investigated the concept about increasing the personalization of the e-learning environment according to the individuality of each student and his expectations about the final results.

The personalization in the e-learning may be defined as a composition of procedures, approaches and techniques for giving the students the tools for learning, which will give them the opportunity to study according to their own capabilities, learning style, knowledge and skills for collaboration.

In future we planed to improve this attempt to categorize and arrange the countless ICT tools according to the defined students learning profiles and also to add new criteria for increasing the personalization in the e-learning process.

REFERENCES

[1]. Иванов И. (2003) Стилове на учене. Втора национална научнопрактическа конференция “ сихолого-педагогическа характеристика на детството”, опово’, Университетско издателство “Св. Кл. хридски”, 29-39.

[2]. Alfano M., Biagio Lenzitti. A Web Search Methodology for Different User Typologies. CompSysTech’09, Ruse, Bulgaria, 18-19 June, IV.6.

[3]. Dureva Daniela, Georgi Totkov. Learning Styles Testing in Moodle. CompSysTech’08, Gabrovo, Bulgaria, 12-13 June, IV-11-1.

[4]. Jones K., Juliet M.,V. Reid. Modifying Teaching to Address Thinking Styles. CompSysTech’07, Rousse, Bulgaria, 14-15 June, IV-10.

[5]. Margarita Todorova, T. Kalushkov, Donika Valcheva, APPROPRIATE E-LEARNING ENVIRONMENT, ACCORDING TO STUDENTS LEARNING TYPE, International Conference on Information Technologies (InfoTech-2008) 19th – 20th September 2008, Bulgaria

[6]. Paiva A. (1997). LEARNER MODELLING FOR COLLABORATIVE LEARNING ENVIRONMENTS. *In Proceedings of AIED'97, Kobe, Japan*, IOS Press, 215-222.

[7]. Rong Wen Jia, Yang Szu Min. The Effects of Learning Style and Flow Experience on the Effectiveness of ELearning. Proceedings of the Fifth IEEE International Conference on Advanced

Learning Technologies (ICALT'05) 0-7695-2338-2/05 $20.00 © 2005 IEEE.

[8]. Sonnenwald, Diane H. and Kim, Seung-Lye (2002) INVESTIGATING THE RELATIONSHIP BETWEEN LEARNING STYLE PREFERENCES AND TEACHING COLLABORATION SKILLS AND TECHNOLOGY*: An Exploratory Study. In Toms, E., Eds. Proceedings American Society for Information Science and Technology*, pages pp. 64-73.

[9]. Valcheva D., Todorova M., Asenov O. (2010b). One Approach for personalization of e-learning. International Conference on e-Learning and the Knowledge Society –e-Learning'10, Riga, Latvia.

[10]. Valcheva, D., M.Todorova, T. Kalushkov. Structuring Multimedia Scenarios According to the Different Learning Modalities. EATIS 2009, Prague, Czech Republic, ISBN #978-1-60558-398-3.

[11]. Wen Jia Rong; Yang Szu Min. The effects of learning style and flow experience on the effectiveness of e-learning. Advanced Learning Technologies, 2005. ICALT 2005. Fifth IEEE International Conference page. 802- 805, http://www.ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1508821&isnumber=32317

[12]. Zhuhadar L. Romero E. Wyatt R. The Effectiveness of Personalization in Delivering E-learning Classes. Advances in Computer-Human Interactions, 2009, ACHI '09, Second International Conferences page 130-135, 1-7 Feb. 2009,

[13]. http://library.thinkquest.org/C005704/content_hwl_learningmodalities.php3.