TECHNOLOGY IN HELP OF PERSONALISED EDUCATION

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Abstract: *The aim of the research is to evaluate the potential of new technologies applied in education. We assess the usage of information and communication technology (ICT) for personalisation of learning resources by examining opinion of teachers in a survey. The results show that to be used in different learning contexts and to meet the needs and preferences of the learners most parameters of educational resources should be changeable. In addition, we examine the views of teachers on how technology-assisted teaching methods affect the students.*

Keywords: *ICT, personalisation, learning resources, teachers' opinion*

1. Introduction

Internet and information and communication technology (ICT) are very important in today's digital society. People live with technology tools, use them in their everyday activities and students are among those who are most active. This is natural because they are born and grow in this digital era and not accidentally are called digital natives [1]. They live, perceive and interpret the world in a different manner, so their educational expectations are also different. Therefore, sustained educational policies should reflect this in the curriculum. Despite much research done, still, not enough attention has been given to the influence of ICT on the education process at school level. Technology in classrooms transforms teaching and enables learning in a more motivating and attractive way. Digital tools allow students to experience "real" phenomena and situations that complement the adoption of new knowledge. They also create an innovative learning environment which offers many possibilities for a personalised education. Traditionally, teachers explain learning material, use demonstrations as examples and practical exercises by using "one fits all" educational resources. Students can achieve great progress if these educational resources are customized and reflect students' learning preferences and needs. Which parameters of the learning resources should be modifiable in order for them to be personalised and easy to use and what features should they have to help a more effective education is the subject of our research. In this regard, the opinion and experience of teachers are very important, so we asked them about those issues. Moreover, our work analyses how technology-enhanced teaching enforces personalisation of education and affects students' skills and abilities.

2. Personalised Learning

The idea of personalised learning has evolved throughout the years. Although widespread, it is not well established because it is rather difficult to implement it in the classroom. The essence is a provision of an individualised learning path and content for each student, which takes into consideration their interests and abilities as well as meets their needs. In other words, it means a shift from uniform "one fits all" knowledge delivery to a student-centred, customised teaching process, i.e. having all students in mind when developing curriculum. Much research in cognitive psychology states that the learners instinctively prefer specific types of delivery, processing, and assimilation of information. In other words, everyone learns in a different way, has different motivation and learning objectives, prefers different pace thus has their own learning style. A study [2] reveals that teaching methods which take into account the entire student's learning preferences and use appropriate ICT resources are more efficient and achieve better results. Thus teachers should use carefully selected digital resources to ensure the active involvement of the students in the learning process, while also encourage creative thinking. Therefore, the better the teaching approach matches learning style and other needs, the better learning outcomes and effectiveness of the educational process are.

Personalised learning implies an initial assessment of: students' interests, the level of skills, cognitive characteristics, strengths, weaknesses, etc. which are at the base of the student's profile. This profile should be regularly updated in order to monitor progress and to reflect the current learning needs. In fact, it helps educators determine the most appropriate teaching approach to each student and to provide them with the most appropriate learning resources in order to maximize their inquisitiveness and engagement. Learners should be able to actively partake in constructing their individual learning path relying on their own interests and preferences as well as to determine their own pace of learning. An effective learning process is thus achieved; students can unlock their potential and can develop their abilities to a great extent [3, 4].

The most usual challenges teachers face when they implement personalised learning, are the need to change the class organization and the redesignation of the curriculum. The availability of learning resources that can easily be adapted to match the needs, preferences, objectives and interests of the students have to be considered too. In addition, those resources need to be able to fit to diverse teaching approaches. Such adaptation is most effortless in a technology-rich environment and when the learning resources are digital. For the sake of personalisation, they have to be easily modifiable and updateable, independent of technologies and platforms, reusable in various learning contexts according to specific goals of the teaching-learning process.

Generally, the quality of learning resources depends on many factors related to content, instructional design, methodology, and used media presentation modes [5].

The *content* is considered both with its format (structure) and design (text parameters, illustrative material, etc.). It should match the subject curriculum, meet the quality standards for factual and presentation issues; have physical format and aesthetic appearance suitable for the intended use; be learner-centred and relevant to the age, level of skills, and learning styles of the students; be properly segmented to allow flexible composition of learning resources according to the learning objectives in order to facilitate knowledge acquisition.

The *methodology* and *instructional design* of the learning resources concern the implemented teaching methods – the educators should be able to use teaching approaches that correspond best to the subject matter and specific learning needs. In order to stimulate students' creativity and motivation, the teachers determine the best teaching methods that suit them: to be activity-based rather than lecture-based; to promote group and cooperative learning, to offer choice and flexibility; to enable interactive and active learning – to encourage the students' analytical thinking, reflecting, questioning, and decision-making; to meet individual requirements concerning abilities, learning styles, and interests.

Along with the traditional methodology, teachers use e-learning resources to provide multisensory guidance that is in help of the illustration of the learning content by real-life examples. The individual and group tasks and activities should avoid unnecessary complexity and provide multiple interactions, which is essential to keep up the students' attention and promote active learning. Thus opportunities for approaching concepts at various levels of difficulty can be provided. Furthermore, the used structure and language of the lesson should ensure age appropriateness and meet the ability of the students. A good idea is for the resources to include reviews and summaries of important information as well as explicit hints for memorization (mind maps).

3. Teachers' View about Personalisation of Learning Resources

At the end of 2015, we conducted a survey that explores many aspects of the application of modern technology in school education. Some of the results were analysed and published in [6, 7]. In this paper, we focus on the matter concerning technology impact on personalisation of education. The influence is both on the teaching methodology and the educational resources. In general, educators require learning resources to be easy to use and to be adaptable for further reuse in a new context. For this reason, we asked Bulgarian teachers about the demanded characteristics of the resources such as appropriate layout, modularity, interactivity, adaptability, platform independence and especially their modifiability. The latter quality concerns the selection of other important features of the learning resources: content, volume (granularity) and sequence of learning units; illustration techniques (text, sound, video, multimedia); text parameters (size, colour, font, background, narration); interactivity mode (individual / group, closed / open questions, drawing

schemes, graphics, figures, etc.). Furthermore, according to teachers, different approaches (passive, active, interactive) should be applicable to each resource; tasks and activities should be modifiable; access to more examples, hints, and links to external information should be provided.

3.1. Required features of learning resources

The respondents define the relevant layout as the most important characteristic of a learning resource (over 83%, Figure 1). It comprises not only the visual but also the acoustic attributes of the product. Many components of both aspects have to be appropriately designed and customised according to the individual requirements and preferences of each student. It is of particular importance to emphasise, that the visual appearance and acoustic illustrations have to support and promote the learning and not to impede students' progress needlessly with perplexing effects.

The ability of the learning resources to be interactive is also highly appreciated (over 82%), thus meaning that to overload students with information is far from good practice in education. The resources have to be smart, varied and diversified, stimulating the interest and motivation of the students.

Another important feature is the adaptability of the learning resources: 64% of the teachers want to freely design and shape those resources, as well as to choose the way, place and time of their usage. Approximately 1/3 of the respondents appreciate the modularity and the platform independence of the learning resources while 1/6 of them select all listed options.
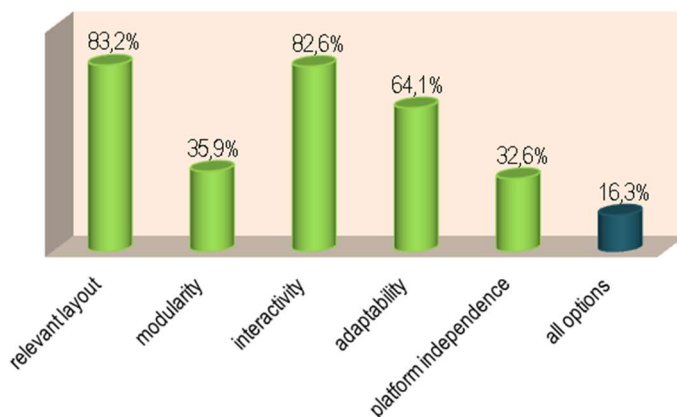

Figure 1 Teachers' opinions on the features of e-learning resources

The adaptability of learning resources depends on their modifiable characteristics (Figure 2). The more modifiable parameters the resources have, the better the personalisation of the lessons to the needs and preferences of the students are.

Significant is the teachers' request for more autonomy in selecting the granularity, content, sequence, and illustration techniques of the learning units. The ability to change these characteristics has great influence on the quality and efficiency of the educational process and thus it contributes best to the handling of concrete situations. The provision of group or individual interactivity in learning resources is highly appreciated too (above 60%). The ability to change the text parameters is not so highly valued (37.5% only). Presumably, since texts are not presented in the modern multisensory e-resources, but more often in the textbooks.
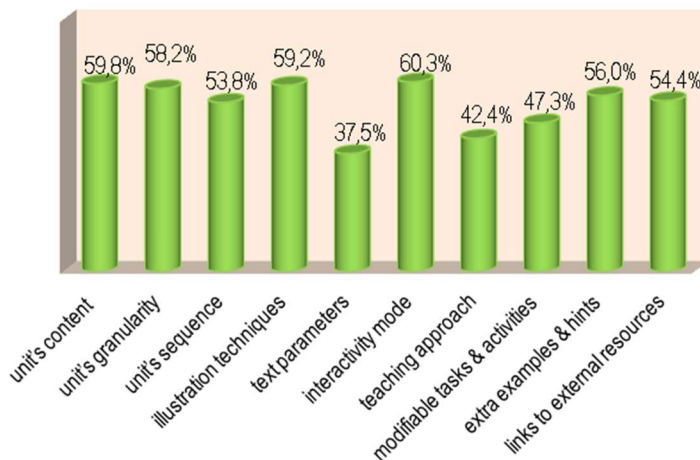

Figure 2 Teachers' opinions on the modifiable characteristics of e-learning resources

3.2. Qualities and skills developed through e-learning resources

Doubtlessly, the use of ICT in the learning process is of great importance. It greatly facilitates teachers, both by diversifying the shape and structure of the lesson and by enriching the learning resources with a generous amount of content. Moreover, ICT makes a very big impact on the learners themselves, not only in the acquisition of new knowledge and skills but also to build up their personality. The results of the poll show that the teachers highly appreciate the contribution of modern technologies to the cognitive field as well as the psychological and social skills of students (Figures 3, 4, and 5).

Along with acquiring skills to work with new technologies and active and safe online behaviour, important social skills such as tolerance and team working are formed (Figure 3). Meanwhile, a competitive spirit is also stimulated. It is necessary to mention the low rate of dialogue given by the respondents, probably because they considered only a vis-à-vis conversation and no other forms of verbal communication (e.g. writing). Additional attention requires the safe behaviour on the Internet, which

is a worldwide problem of growing importance. Its significance has to be comprehended and relevant skills have to be acquired at school age.
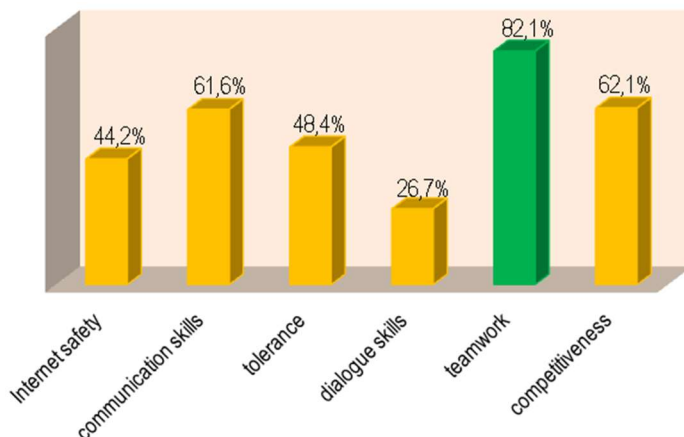
Figure 3 Teachers' opinions on the role of ICT in the development of social skills

By analysing the psychological qualities, the weaknesses and strengths of each learner can be determined and recorded in a learner's profile. This profile contains information about the preferred learning style and the appropriate pedagogical methods recommended for the student [8]. This way, the strengths of the learner can be effectively exploited to acquire new knowledge and skills, while working to overcome their own weaknesses.
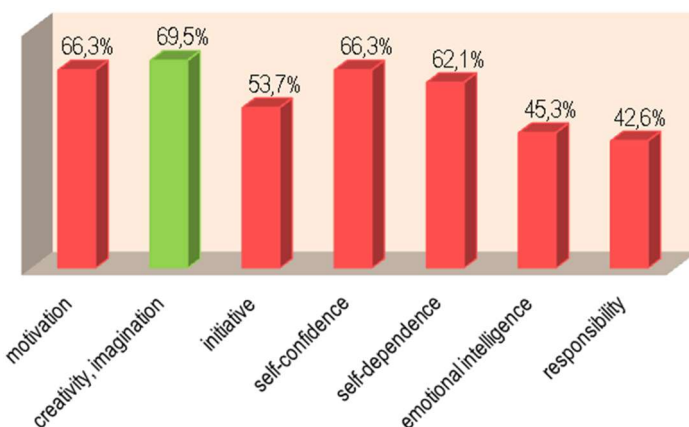
Figure 4 Teachers' opinions on the role of ICT in the development of psychological qualities

ICT largely contributes to the development of imagination and creativity – almost 70% of respondents are of this opinion. Not by chance, this is the highest value of the group of psychological characteristics (Figure 4). Stimulating these qualities appropriately affects other psychological characteristics such as motivation, initiative, self-confidence, and self-dependence. However, attention should also be paid to the development of emotional intelligence and responsibility – qualities of utmost importance for the formation of personality.
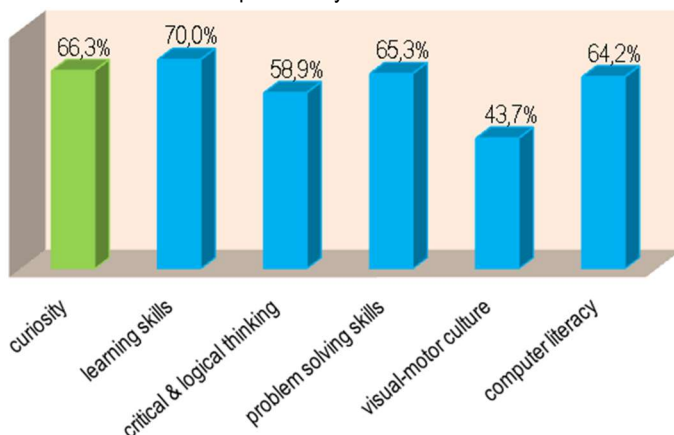

Figure 5 Teachers' opinions on the role of ICT in the development of cognition

The above-mentioned psychological qualities are the basis for efficient acquisition of new knowledge and skills. On one hand, without initiative and self-confidence, curiosity cannot be manifested; without imagination and creativity there is no problem solving; without motivation, there is neither thinking nor learning. On the other hand, curiosity is an important engine that stimulates the development of psychological characteristics such as initiative and motivation. According to the respondents, this is the second most highly developed quality by ICT after the standard training skills (Figure 5). In the educational process, ICT promotes the development of these interrelated characteristics, and the implementation of personal education plans enables unobtrusive control of the process of mastering knowledge and skills. The latter is important with regard to the psyche of adolescents who, as a general rule, do not agree to gross views and rules being imposed on them.

To sum up the results from our survey – according to the teachers' opinions the use of ICT resources in school education contributes to a significant enhancement of both the didactics and the efficiency of the teaching process. Furthermore, they redound to students' acquirements and help the development of their social skills and psychological growth. It is important to point out that modern technological tools make it possible to personalise both pedagogical strategies and learning resources. ICT is

extremely useful for teachers since it supports them considerably in their entire professional activity.

Conclusion

Nowadays the teaching process often runs in the traditional manner, face-to-face, but in technology-rich classrooms with interactive boards, projectors, audio/ video tools, etc. using digital learning resources. All these tools offer students many possibilities regarding motivation, engagement, participation, communication, autonomous and collaborative work, thus considerably impact students' learning growth. One of the most challenging issues in education is personalisation – to offer active learning methodologies, a variety of teaching approaches and tailored activities; their implementation through ICT tools and resources in order to be suitable for various learning styles. The main advantage of multisensory interactive learning resources is that they can support the whole learning process: from individual experience and reflective observation to abstract thinking and active experimentation. They also contribute to the fulfilment of the needs and interests of each student.

This survey leads us to the inference that the use of innovative technologies in the classrooms enhances the teaching-learning process since it can be easily personalised for each student. ICT helps to improve cognitive, psychological and social skills and thus affects their individual achievements. Our empirical study leads to further research directions. It is interesting to explore the use of personalized resources in different learning subjects by students, thus comparing the findings with the view of the surveyed teachers to draw more reliable conclusions.

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ТЕХНОЛОГИИТЕ В ПОМОЩ НА ПЕРСОНАЛИЗИРАНОТО ОБУЧЕНИЕ

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Резюме: *В доклада се представя оценка на потенциала на новите технологии, прилагани в образованието. Използването на информационните и комуникационни технологии (ИКТ) се оценява от гледна точка на персонализацията на учебните ресурси. В основата на анализа стои мнението на учителите, според което повечето параметри на учебните ресурси трябва да могат да се променят. Това е необходимо, за да се използват ресурсите в различни учебни сценарии, както и да съответстват на предпочитанията и нуждите на учащите. Акцентира се и на влиянието, което оказва преподаване с помощта на технологии върху учениците.*

Ключови думи: *ИКТ, персонализация, учебни ресурси, мнение на учителите*