

# Modern Trends in Education

Ján Mikuláš Zigo<sup>1</sup>, Gregor Rozinaj<sup>2</sup>

<sup>1</sup> Inst. of Telecommunications, Slovak University of Technology in Bratislava, Ilkovičova 3, 812 19 Bratislava, Slovakia  
*xzigoj1@stuba.sk*

**Abstract** - State education system usually has a massive influence on the state economy, the development of state, industry and others. Because of that, it is essential to use all available resources to improve its quality. An accessibility of new technological inventions allows using new methods that make teaching easier. One of those inventions is virtual reality and devices that make virtual reality able to use. They create virtual three-dimensional space around user, bringing an immersive experience to user.

**Keywords** – Modern trends; virtual reality; education

## I. INTRODUCTION

There are many different ways to make teaching material more attractive to learn, so that a student can remember as much as possible, and - what is most important – can select and remember information, that will be useful for him in the future.

With the arrival of the technology era, when new devices are being developed almost every day and they are continuously becoming more accessible to the masses, it is possible to use learning methods, that were not invented for centuries, and yet not accessible in the last few decades.

The majority of people who dedicate the biggest part of their time to learning, are children and young people aged 6 - 24. Amongst teenagers living in the USA aged 13 – 17, 88% of them own, or have direct access to use mobile phone and 87% of them own, or have direct access to computer usage [1]. This creates a suitable environment for the creation of new education trends, that can rapidly change the way humanity perceives education.

## II. STUDENT-CENTERED LEARNING

The majority of teachers in Slovak schools use teacher-centered learning. Teachers teach materials, and if they give homeworks to students, it is meant to be done on their own. However, this often raises either student disinterest or misunderstanding of learn materials.

On the other side, student-centered learning aims for student-teacher, or student-student interaction. In this case, teacher is interested in the student's personality, his hobbies and interests. Based on this knowledge, teacher gives specific tasks and homeworks, that can teach a student facts and skills interesting for him, and at the same time, they instigate student into studying optional learn material.

Student-centered learning is of course more difficult for teacher, because it usually takes more time for one student to study a learn material than for another student. This issue may be resolved by using a teaching method called „Flipped classroom“. Students teach themselves outside school and they come to school only to discuss about what they've learned. This

method however, requires students to do their homeworks – something, that is often very difficult to achieve.

## III. E-LEARNING

E-learning is – briefly said – a learning method that uses information and communication technologies to help students with learning. That means, the role of teacher is only replaced or complementary. E – learning offers many different learning methods. Many of them are widely used nowadays, and are still spreading and gaining popularity because of their simpleness and great advantages.

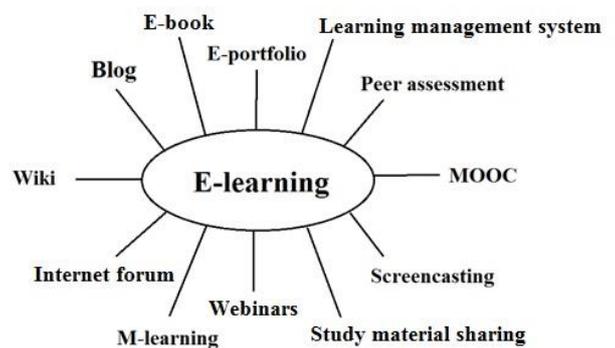


Figure 1. Some e-learning types.

### A. Learning management systems

Learning Management System (LMS) is a software application that automates the administration of training program [2]. By now, most colleges and universities in Slovakia use their own form of academic information system. This information system typically provides extensive functionality, which replaces many acts that would otherwise have to be performed manually. Whether is it to help a student who does not have to visit a school if he wants to know his test result, or if a student wants to write exam mark in the study record, or if a student wants to ask his professor a question, all these activities can be thanks to an information system done from anywhere in the world, as far as there is an internet access.

Teacher has the advantage that he can at any time, for example, send a message to his students, has courseworks from all students submitted and available to view in one place in electronic form, can submit study materials for all students etc.

### B. Massive open online course

Massive open online course (MOOC) offers training via the Internet focused on a specific area for an unlimited amount of students, usually free. It works on a similar principles as in a

university: lecturer teaches a lecture, students can receive tasks to do, or the teacher can verify learn material knowledge of his students through a test. The difference is mostly in the openness of the system for anyone with an internet connection. Participating students from around the world discuss with each other or with teachers about issues related to the subject matter or work assesment [3]. Therefore, problems are much easier to solve when students count is high. It is also advantageous for teachers, because through discussion, they can gain new ideas and perspectives that will improve the quality of their future learning.

The biggest disadvantage of such a system is paradoxically one of its advantage - capacity. If the students count registered to a course is high (in thousands), it is not really possible for a teacher to take care of each student in the consultation form.

### C. Study materials sharing

File storage services (e.g. Google Drive), documents storage services (e.g. Google Docs), programming codes storage (e.g. GitHub) and many others "open the door" to access the study materials. Students can share documents with each other - study materials and problems solutions, they may cooperate in the creation of documents and other study aids, while discussing online. An additional advantage of this system is the fact that since these are electronic files that are stored on Web servers, they are accessible not just to everybody (if the situation requires so, it can be limited to particular people), but also at any time. This is particularly advantageous for school students, who can use files created by students from previous years.

As far as there are advantages, there are disadvantages too. Students work together without supervising from a teacher. Therefore information accuracy in the documents is not ensured. The student can thus learn incorrect information. Another disadvantage is plagiarism. In almost every major group of students is present someone who not only will present all or part of the work of a foreign author as their own, but often does not even know how the task was solved.

### D. E-book

Electronic book (also known as the e-book) is a book converted to digital form. Its main advantage is its availability, because it can be transported via electronic devices, whether designed for transferring files such as USB keys or external hard drive, or even destined directly for reading, such as e-book reader, smartphone or tablet.

Whereas the average e-book takes up only a small fraction of the memory compared to the above mentioned carriers capacity, it is possible to have a large count of books always available to choose from, which in standard book form is nearly impossible. The student can then spend e.g. travel time studying without having to carry heavy textbooks or other paper documents. Finally, electronic books protect the environment because they do not contain any paper so there is no need to cut trees to produce them, which usually means lower cost compared to traditional books.

When using the e-book, it is unfortunately necessary as with any other electrical device to think about the battery level of a reader device, which can sometimes cause problems.

### E. M-learning

Modern technology can provide a medium to realize the student-centered learning model when using gamification. At present there is already a large number of such software. It is significantly influenced by mobile learning (M-learning). That means using mobile phones, tablets and other portable devices for learning.

Thanks to the massive spread of smartphones, this way of learning is available to the majority of the population in developed countries.



Figure 2. The smartphone ownership percentage. [4]

At Google Play store (which provides applications for the Android operating system) various kinds of learning applications are available, from all major foreign languages learning applications through drawing and playing music to the programming in various languages. Many of them are free, but the better quality ones cost a small fee. Each of them is interactive and requires user feedback, whether in the form of a written text, or in the case of language or music learning it requires sound recording.

### F. Gamification

Gamification is the application of game elements and techniques of digital game design to solve problems unrelated to the games. [5] Its main objective is to keep the student's attention and motivate them to continue learning. In the learning software, gamification can be seen in e.g. making new lesson available after finishing the another, comparing results online with players from around the world, gaining points for solving problems and then gathering certain advantages while using the application, and so on.

## IV. COMPUTER-MEDIATED REALITY

Computer-mediated or artificial reality means a perception of the surrounding world, when a person using hand-held device or special kind of computer perceives artificial objects with their human sensory organs. This objects are either completely computer-generated or their appearance to human senses is changed. Since regular person without a handicap perceives the

surrounding world at most through visual and auditory organs, computer-mediated reality aims primarily for video and audio modification.

Computer-mediated reality is experiencing its greatest growth amongst casual users in recent years, as the (mainly) graphic output hardware requirements required for an immersive user experience, are very high. Also, the physical size and weight of equipment required to experience an artificial reality in the past was very high. Back then it was primarily used for gaming purposes. But with the arrival of new, more powerful technologies, in addition to the game industry it began to be used for other purposes.

While there is no serious scientific research whether it is more effective to study only by reading books, or by making direct interaction with the studied object, many people declare, that the more experience they have with something, the easier is it to learn about it.

Education is therefore certainly an area where artificial reality can be effectively applied. In regular schools, students are exposed mostly to theoretical information. If a student is not interested in an area concerning newly learned information, they are likely to forget it in a short time. Theoretical information are taught primarily due to fact that in the classrooms it is not possible to create visualization conditions corresponding covered topics. Students cannot, for example, view historical exhibits or track the movement of sound waves. Although at present artificial reality is used in education only rarely - there are still hardware limitations and the lack of appropriate software - this area has great growth potential.

Most immersive presentation of an artificial reality has been achieved through virtual reality, augmented reality and CAVE systems.

#### A. Virtual reality

Virtual reality is an environment that is completely computer-generated, without the presence of objects from the real world.



Figure 3. Using virtual reality – HTC Vive. [6]

For its simulation it uses mainly video and audio, and in some cases, multi-sensory perceptions. The video is created separately for left and right eye. It is because of the 3D effect. The right eye watches the video from a camera positioned a small distance to the right from the camera recording video for

the left eye. Usually user can also interact with virtual objects, which increases the authenticity of the experience.

In education, virtual reality can be suitably used to illustrate phenomena which can not be naturally seen or are hardly available. It can be also used (and at present is for educational purposes mainly used) as a work simulator that requires precision, yet in reality is not acceptable to act mistakes.

One example is the implementation of surgical procedures. Canadian company Conquer Mobile is in the process of creating technology for teaching medical personnel called PeriopSim VR. This technology simulates surgery operation and the user's task is to assist the doctor during surgery.



Figure 4. The use of VR technology PeriopSim [7].

#### B. Augmented Reality

The main difference between virtual reality and augmented reality is mixing objects the real world objects with the ones in virtual world. The advantage over virtual reality is thus ability to see virtual objects side by side real objects and e.g. compare their size to those of the real world.

It could be used for educational purpose for example for city tours or in museums, where it could show information about exhibit objects or even show information video or animation.

#### ACKNOWLEDGMENT

This research was done with support of projects Horizon2020 688503 – NEWTON and VEGA INOMET 1/0800/16.

#### REFERENCES

- [1] Pew Research Centre's Teens Relationships Survey, 25.9.2014 – 9.10.2014 and 10.2.2015 – 16.3.2015
- [2] Ellis, Ryann K. 2009. A Field Guide to Learning Management Systems. ASTD Learning Circuits
- [3] Pappano, L. 2012. The Year of the MOOC <http://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html>
- [4] Pew Research Centre. 2015. Smartphone Ownership and Internet Usage Continues to Climb in Emerging Economies <http://www.pewglobal.org/2016/02/22/smartphone-ownership-and-internet-usage-continues-to-climb-in-emerging-economies/2-23-2016-10-31-58-am-2/>
- [5] Werbach, K. Gamification <https://www.coursera.org/learn/gamification>
- [6] <http://static2.businessinsider.com/image/56955da5dd0895ca1e8b4805-2455-1228/tweedievr.jpg>

- [7] <http://shintavr.com/files/image/5682782a42194-VirtualRealityForSurgeonsTraining1024x476.jpg>