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Digital learning on the basis of 21st century higher education

Introduction

The rapid development of ICT is constantly calling for society and economics, as well as our way of life. This tendency is being intensified these days by the transformation of the basic lifestyles, tasks and roles besides the changes of the education system and its components. The major shifts in technical and technological advancements have resulted in the development of the learning environment and the spread of digital learning therefore required the adjustment of learning forms and fundamental principles (Benedek, 2013). Its signs are primarily visible in the changes of the classical teaching-learning methods, the redefining of the learning environment and the shifts of different roles (Szűts, 2009; Kálmán, 2016). The effects of these can be sensed in every educational area, from elementary schools through vocational training to higher education (Molnár, 2014).

LMS systems – Moodle

In Hungary the most popular LMS systems are: Drupal – http://drupal.hu, Joomla – http://joomla.org.hu, Moodle – http://moodle.org, Wordpress – http://word-press.hu, ILIAS, and Olat – www.olat.org.

They all share common characteristics:

- open source
- use various programing languages (php/.NET asp)
- simple or complex modular framework that can be completed with functional modules and plugins.

The most common system used worldwide is Moodle, so Budapest University of Technology and Education uses it also.

The Moodle system introduced in 2006 at the Department of Technical Education, Budapest University of Technology and Economics can be considered a formal social media network which, according to the statistical data, has achieved significant results in both learning management and content management. The system facilitates communication between teachers and students, the measurement of their activity, and the use of social forums, evaluation and provision of feedback in an electronic environment, in addition to allowing course materials to be downloaded (Benedek-Molnár, 2015). The behavior of the nearly 3,500 students using the system in an electronic learning supporting system can be monitored by means of different statistical measuring facilities such as the built-in statistical measurement system of the Moodle. This allows the diagnosis of the students' activity (both overall and broken down).

The report module of the system provides information about the users' activity. Figure 1 shows the activity pattern over three years, with the students' activity shown in red. It is evident that the maximum amplitudes which occurred were related to test dates or assignment deadlines.
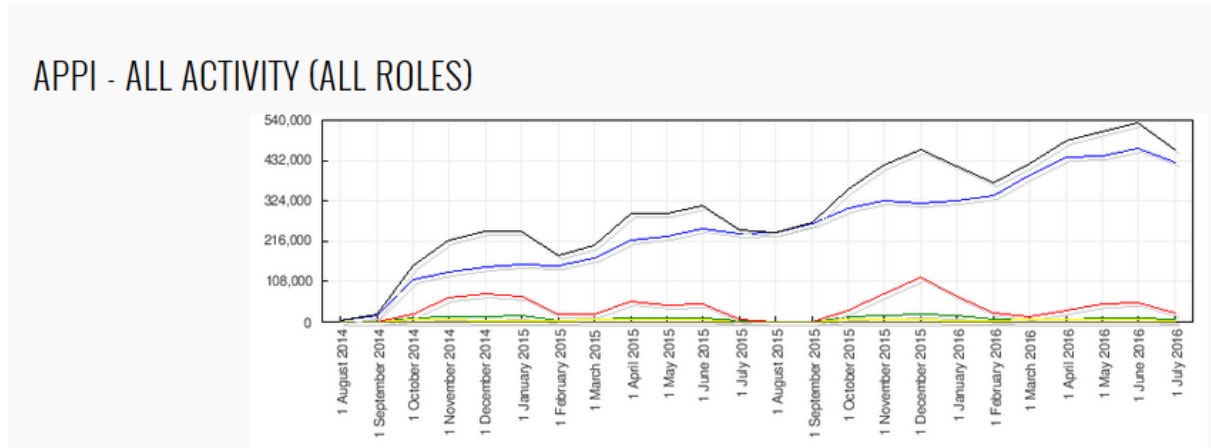

Figure 1. The activity in the Moodle system of the Department of Technical Education. Source: own figure

The other measurement tool employed is the Google analytics system, which when linked to the Moodle system also provided useful and informative statistical data as shown in Figures 2. and 3. concerning an elective courses.
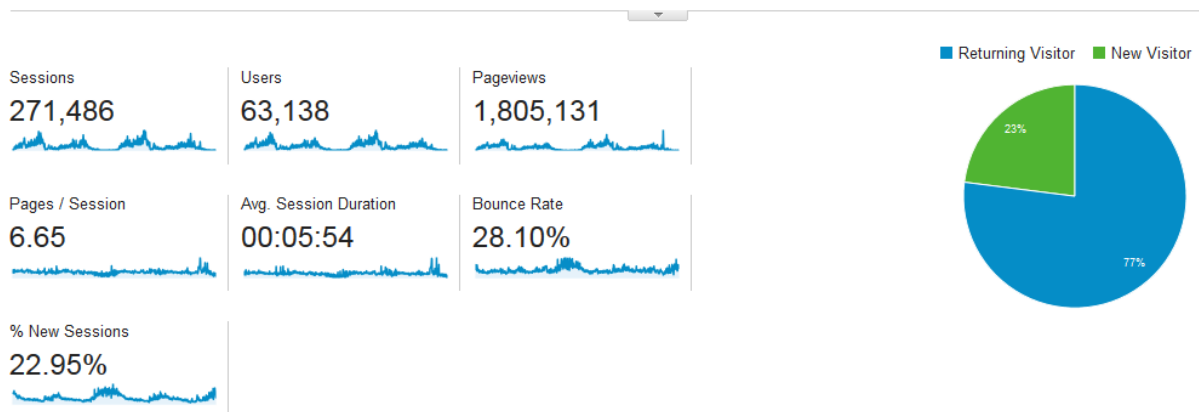

Figure 2. The activity of the participants of the Moodle courses. Source: own figure

Cloud-based solutions

Cloud-services appeared in the 2010s in the field of IT, and the number of cloud-service providers has increased dramatically ever since. Today, the mobile ICT devices enable the everyday use of them owning to their benefits which include reliable and budget-priced execution and operation, 80-90% of capacity utilization, small investment demand and limitless computer resources.

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Generally speaking, these cloud-based systems intend to maintain cross-connections between different services, which is one of the essential notions of the system. It means that the created content is accessible from another service-provider thus the users are let off from reloading data and information to the new system.

The cloud-based information storing is provided by various hosting servers all of which are tightly connected to different operational system platforms. To name a few, the unarguably most frequently used hosting provider is tight-knitted with the Android system-based Drive-type systems, whereas the iOS systems use the Dropbox hosting services, and the skyrocketing Windows phone op-systems prefer OneDrive. Based on some preliminary forecasts, the growth rate of the cloud-based services will be several times (four or five times) more than as of the general ICT growth in the period between 2013 and 2017 thus the possible methodological use of these services is to be evaluated in the feasibility study of the research (Holik-Sanda, 2016).

What is more, the cloud-based services enable multiple users to co-work on a common project in the form of crowdsourcing. In order to study its practice, crowdsourcing projects could be initiated among state school teachers in which the participants were asked to channel their own know-how and knowledge into an interdisciplinary task. We could gather valuable information concerning the working process and were able to study efficiency and what cloud-based applications could help in task-accomplishment. Some distributed motors such as *Pentaho* or *Hadoop* will be used for analyzing shared content.

Trello is a cloud and group work based service which is capable of attaching files hosted in Google Drive to various tasks without having to re-upload them. The following screenshot demonstrates the opening page of *Trello* and its boards with some visible markers.
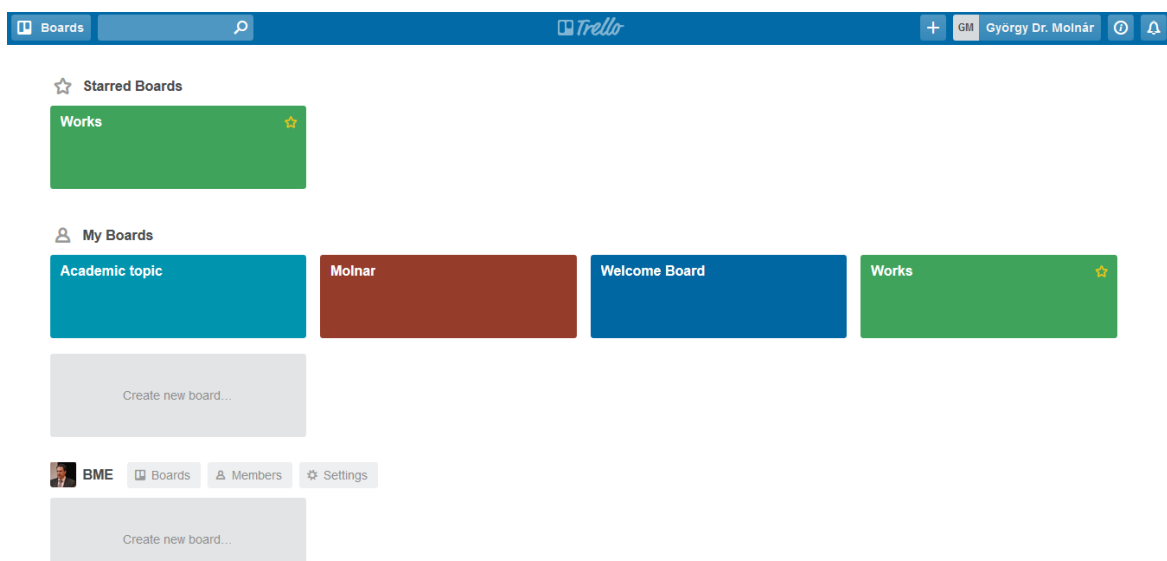

Figure 3.: The opening page of Trello and some personal boards. Source: own screenshot

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Scratch (https://scratch.mit.edu) is a project-based application (Kővári, 2016) and *Learningapps* (learningapps.org) is a community-based service, both of which could be used for co-working purposes.
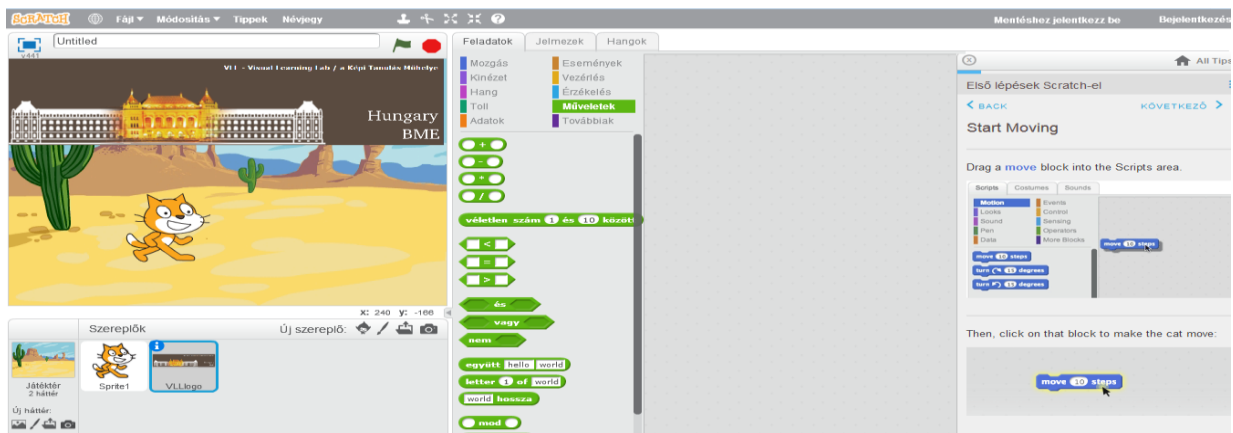

Figure 4: The editorial page of Scratch. Source: own screenshot.

MOOC systems

The theory of education has dealt with online teaching for some time while focusing on distance learning. It is noteworthy, however, that in 2012-2013 major universities in USA started a complex innovation project: MOOC. Massive Open Online Courses thence have become an important strategical development course at European University Association (EUA) as well. This innovation is a great example how the traditional boundaries are outspread by a new learning form which „environmental" understanding is more progressive than ever.

From a professional point of view it is particularly interesting that universities known for conservative teaching and learning methods have developed MOOC. These online courses have free (non-formal) access, no limits for participation, and non-formal ways of entry. They also share the disadvantage of not providing students with credits. On the basis of the properties listed above the experiment could be interpreted as a support for non-formal learning, an attempt within the framework of the traditional dissemination of information. Yet the importance and the professional value of the initiative is greatly increased by the fact that the best US universities offer the free open courses.
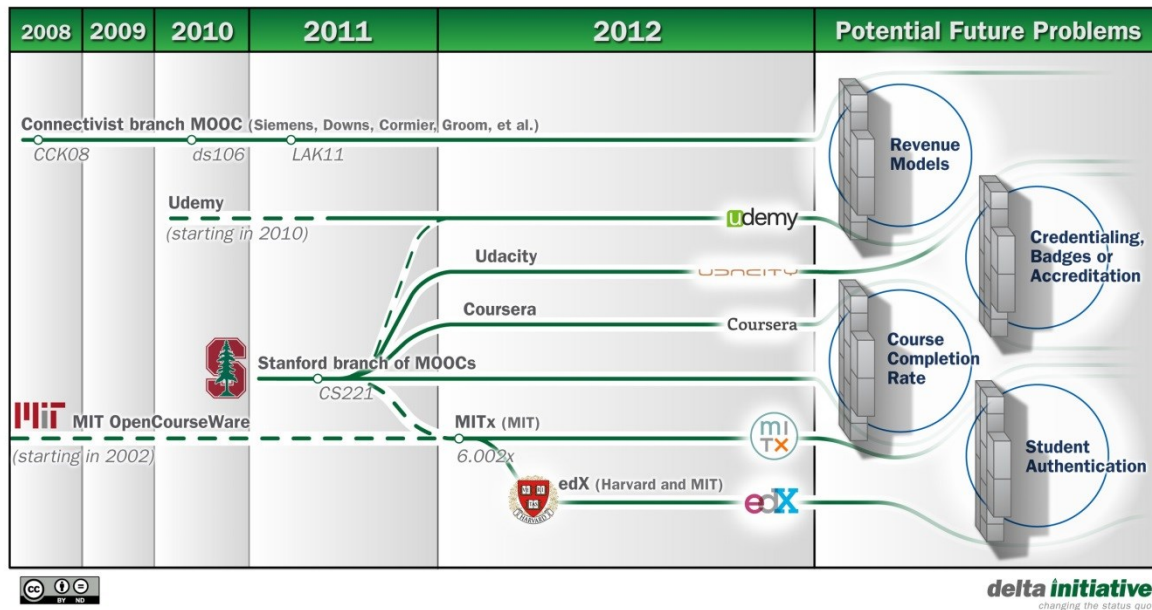
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Figure 5.: Development of MOOC courses between 2008-2012, Source: Phil Hill, e-literate, 24/07/2012: Four Barriers That MOOCs Must Overcome To Build a Sustainable Model, http://mfeldstein.com/four-barriers-that-moocs-must-overcome-to-become-sustainable-model/ (downloaded: 2013. 03. 10.)

The most popular portals offering online courses (one of them being the EDX) have millions of registered students. The online courses are designed so that everyone has access to free and high quality education, which is mainly supported by implemented educational video materials. edX has several open sources based systems, own technology and source code. The percentage of students coming from different countries is: 27% USA, 11% India, 4% China, Brazil and United Kingdom, 3% Canada and Mexico, 49% other countries.

A Hungarian innovative project was started in 2016 called K-MOOC (Carpathian Basin Online Education Center), where several MOOC courses were offered in Hungarian. One of the courses can be seen on the screenshot.

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Figure 6.: K-MOOC MOOC courses

Virtual reality

Virtual worlds, surfaces, classrooms and courses can be found in a 3D game called Second Life. This program is popular worldwide. Originally, the developers wanted to build the game's virtual world, but different virtual campuses have been released since. In these, there are virtual classrooms, courses, faculties, students, all that is needed in reality in order for educational process to take place. The use of a virtual learning environment for teaching has got stronger and stronger domestic practice in Hungary too. Many examples of courses or conferences can be found, where the real person's avatar gets the main role, bridging the geographical limits of the real space. The following illustration shows the inner space of a campus, where students can chat or present on screen.

Figure 7.: Illustration: ELTE GRID virtual classroom, course: own screenshot

Latest developments center on virtualizing the social networking site Facebook. The name of the project is Oculus (Szűts, 2011). For this, only a console, haptic gloves that imitate touch

and a visor is needed. In the field of education the idea of virtual has also appeared, and registration is now available on Google Classroom and Craft Class interface also developed by Google. The following screenshot presents the virtual surface of Google classroom.

Figure 8.: Illustration: Google virtual classroom, source, own screenshot

Summary

Modern, ICT based solutions can help young generations both in teaching and learning. If appropriate solutions are developed, even those with special needs can benefit. Prosperous use of social media in education in obvious, and it helps the expansion of informal learning dimension. The greatest educational challenge is motivation, awareness-raising and sustaining. This can help the teachers of the modern e-learning support solutions (Benedek-Horváth, 2016). For this some practical examples were suggested by the author. The efficiency of the appropriate methodological design culture lies in the possibility of learning from each other. An aspect that must be accepted in today's educational system. This methodology enables us to thrive in today's changing digital world.

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