Virtual Classrooms

National University of Public Service
Hungary
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Virtual Classrooms
in Postgraduate Training at the National University of Public Service, Hungary

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'Multimedia brought the world into the classroom and smart technologies will take the classroom into the world'
(Steve Wheeler, 2010)[2]

This study draws attention to the possibility that now, in Hungary, virtual reality, standing at the top in the inner convergence of e-government, would be the first in the world to be realized, if not elsewhere, in the educational methodology of postgraduate training of civil servants. In 2014-15 there was an e-learning type of post graduate NUPS training program headed by the Author, for the civil servants employed by local governments. It consisted of 6 modules, each presuming an average 90 minute long online learning time. There were 12 thousand civil servants who registered for any of these 6 modules all together. Statistics of the training showed an average 7 minute long online attendance on part of the students, before taking the online exam! The interactivity of the e-learning systems is not sophisticated enough to control the learning process and to motivate students to study the material. It is evident for anyone dealing with e-learning courses, including the webinars, and it is the ultimate reason why a new, real time and fully interoperable online system has to be applied.

Why Virtual Reality?

Anyone, having participated in the post graduate administrative training courses organized by the NUPS in the Leadership and Post Graduate Training Center, may have the impression that the attitude of the average Hungarian civil servant towards compulsory post graduate training is quite acceptable. The threefold impact of administration (BUDAI 2009)[3] manifests itself in post graduate training, too. The difficulty of funding (1) is manifested in the travel time and cost of the participants of the trainings. Customer-side expectations (2) are represented in the need for affordable, yet effective, methods

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[2] WHEELER, S. 2010. WEB 3.0: The Way Forward? – Presentation. Vital Meet, St. James School, Exeter, 14th July, 2010.
[3] BUDAI B. 2009. *Az e-közigazgatás elmélete – Theory of e-Government.* Budapest, Akadémiai Kiadó

at home. Finally the EU regulations (3) call for the development of e-Government education content, which is obvious in administrative modernization, which also affects postgraduate training of the civil servants. So the call is that we use the traditional inventive potentials of people to increase the efficiency of post graduate training.

In the last decade, the organization of electronic administration organization in Hungary has come close to an ICT convergence axis, with mobile phone launching (BUDAI 2005)[4] and the development of the interactive digital television administration model (TÓZSA 2009[5], 2010[6]), building and converging mobile Internet and interactive television platforms into a new level. This is the virtual administration (TÓZSA 2013[7], 2014[8]), if public administration modernization is interpreted as the ICT platform for content development in e-administration.

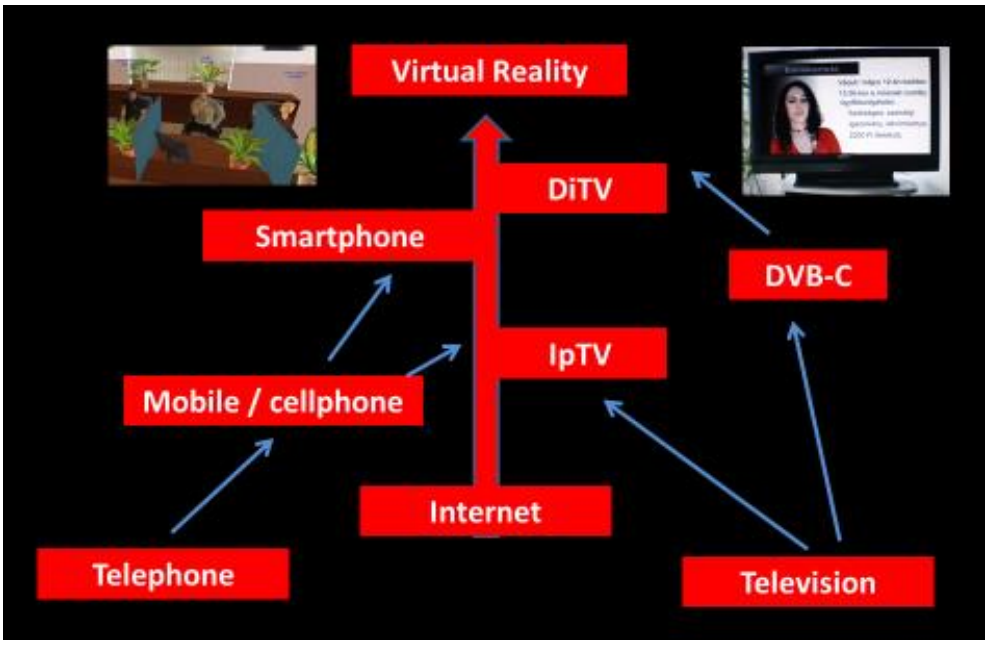


Figure 1. Virtual Reality can be regarded today as the top of the information-communication convergence of the telephone and the television initiated by Internet. Source: Author's own edition.

[4] BUDAI B. – SÜKÖSD M. 2005. *M-kormányzat M-demokrácia – M-Government M-Democracy*. Budapest, Akadémiai Kiadó

[5] TÓZSA I. – HUBERT O. 2009. *A digitális TV közigazgatási tartalomfejlesztése – Public Administration Content Development of Digital TV.* E-Government Tanulmányok XXVII. Budapest. E-Government Alapítvány

[6] TÓZSA I. 2010. *T-Government Interactive TV in Public Administration.* Panel Report during the 8th EuroITV Conference held in Tampere, Finland, 9th-11th June 2010. Issued by Digital Interactive Television Services Ltd, E-Government Foundation, Corvinus University of Budapest, Hungary

[7] TÓZSA I. 2013. Virtual Reality and Public Administration. *Transylvanian Review of Administrative Sciences* 38. 2. pp 202-212

[8] TÓZSA I. 2014. The Architecture of 3D Administration. *Public Administration Research Canadian Center of Science and Education* 3. 1. pp 68-79

In addition to telephone customer service administration in the beginning of the 2000s, the mobile phone SMS introduced a new level (m-government) in electronic government and in the middle of the 2000s it was followed by the involvement of the WAP's ongoing dialogue possibility. It projected an image of an administration available at any time. On the other side, with the better resolution and simpler handling of the TV sets, it was theoretically possible to extend the range of electronic customer services across the digital divide through the possibilities of IpTV and digital interactive cable TV (DVB-C) after the digital switchover to digital interactive TV. In government context it is the age of t-government. The top of all these is the creation of a 3-dimensional, easy-to-manage and built-in virtual spaces, which provide smart phone Internet access along with traditional wired Internet and digital interactive television. Naturally, graduate and especially postgraduate public administrative training programs should not neglect these aspects, which stand for the outlines of the future and must be in the perspective of any innovative civil and public servant.

Figure 2. In cities built in virtual reality, shopping, banking, education, art and entertainment performances are already available. Public administration services, graduate and post graduate higher education trainings will sooner or later appear in the virtual reality. (Source of images: http://www.google.hu/imgres?q=second+life City/Shopping/University/Art)

The emergence and spread of information communication technology over the last decade has completely transformed the spatiality and workflow of economic processes. Physical distances have shortened or disappeared with online shopping, digital communities, distance labor and education. The space of the information society is favorable

to overcome the drawbacks of forced disability (bad or expensive transport, disability, illness, maternity leave).

In line with the needs of the information society, there is a growing need for systems capable of expanding physical space and creating new dimensions in the field of services, first of all in the entertainment industry. Currently, these are represented in the so-called virtual space three-dimensional systems at the highest level.

Following the definitions of JAKOBI (2007)[9], the space of the information society is multiple; Cyberspace appears under real space as infrastructure, which is the Cartesian world of electronic networks, wires, coverage, servers and programs (MÉSZÁROS 2003)[10]. The mental space can be of two kinds, on the one hand, the current space is the virtual reality, and on the other hand, the space of virtual elements appearing in the physical space, that is, the so-called hybrid space, the exploitation of which already evokes the world of science fiction like that of the Matrix, Surrogates and Avatar.

The concept of virtual space was defined just two decades ago as an interactive three-dimensional environment generated by electronic systems that users can experience. In the Hungarian literature NEMESLAKI (2012)[11] summarizes the characteristics of the economy operating in virtual reality. According to these, virtual reality is the artificial environment created by computer systems, in which the user's virtual identity (the 'Avatar') enters into real-time symbolic representations of real things. In the head-to-head world it is already the case that executives of a company hold a real-time business meeting in a virtual version of their office building without being physically there - and this is not a video conference; - or just being represented by college students in a virtual seminar classroom where there is a good lesson or lecture while students and trainers can actually be anywhere.

In the context of higher education and research, we must emphasize the importance of high-tech information communication technology appearing here. It is known that during the economic crisis at the end of the first decade of the 21st century, only innovation-oriented companies could prosper. Higher education and scientific research are the catalysts for the economic appearance of innovation. The most recent example of this in public administration, is the case of Estonia, where after the change of regime (1993), they have put extra emphasis on state support for higher education and research, well above the EU average. Think of the Estonian e-Government Academy and the well-

[9] JAKOBI Á. 2007. *Az információs társadalom térbelisége – Spatiality of Information Society*. ELTE Regionális Tudományi Tanszék, Budapest.
[10] MÉSZÁROS R. 2003. *Kibertér. A földrajzi tudás új dimenziói – New Dimensions of Geographical Knowledge.* Hispánia Kiadó, Szeged.
[11] NEMESLAKI A. 2012. *Vállalati internetstratégia – Corporation Internet Strategy.* Akadémiai Kiadó, Budapest.

functioning Estonian e-administration, which was realized in the decade after the change of regime.

It is clear that if we do not want to get behind the developed world, again and again, we cannot pretend that these technologies do not exist. All the more so, because in this type of application development, Hungarian professionals also play a significant role in the developed world. For the time being, virtual reality is still closed in public administration all over the world. The aim of this study is to persuade Hungarian decision-makers and the professional public of science to open up a door for virtual reality in the close future, at least in the field of local government post graduate education, where there is now a science-historical opportunity when this methodological invention is at the forefront of the world. It can easily become a three-dimensional information communication content development.

Table 1. Major characteristics of the development of the Internet

WEB 1.0	WEB 2.0	WEB 3.0
homepages	two way web, blogs, wikis, video, podcasts, sharing, personal publishing, social networks, digital communities	co-creative web, 3D portals, virtual reality, avatars, augmented reality, block chains, bitcoin commerce and finance, education, interoperable profiles, integrated game, 3D printing
PUSH (age of displaying information)	SHARE (age of sharing information)	LIVE (age of living in information)

Source: What is WEB 3.0? A Brief Introduction and its Benefits. *https://1stwebdesigner.com/what-is-web-3-0/*

Virtualization is a basic element during the transition from WEB 2.0 to 3.0. The following Internet development stage will become a reality when we go beyond the current limits of virtual reality technologies.

WEB 3.0 is going to be different from what we know as WEB 2.0. Virtual reality and block chain will play a big role in it, leading to augmented reality. Augmented reality is a type of interactive, reality-like display environment that uses computer generated display, sound, text and effects to enhance the user's real-world experience. Augmented reality combines real and computer-based scenes and images to deliver an enhanced view of the world.[12]

Besides the virtualization of shopping, games, block chain transactions, it is the virtualization of arts that has the strongest impact on the virtualization of education in lecturing. Virtualization can make the sensorial experience more impressive, enhancing the

[12] TECHOPEDIA (2018) https://www.techopedia.com/definition/4776/augmented-reality-ar

impact of all arts, including presentation and demonstration needed in lecturing. Contents can be produced by teachers and consumed by students in 3D forms, virtually present like objects or animals you can touch without risk of physical touch. In WEB 3.0, teachers can share their online portfolio in a new 3D format which can be consumed on PC-s, smartphones or next generation virtual reality headsets.

Post Graduate Training of Civil Servants in Virtual Reality

According to CHOI (2003)[13], the elements of virtual space are symbolic representations of artificial and natural things. So when we build a virtual administrative or educational space, we have to create service patterns by copying the real world, that is, the actual services and environments. When creating virtual administration reality, we have to mimic, simulate the real physical management or educational environment as precisely as possible regarding certain elements, components of the office or school buildings.

According to the special literature, the construction of virtual reality has three conditions, which, in the virtual world created for administrative or educational purposes can be:

- An electronically generated three-dimensional administrative (office or school) environment;
- Real-time interactive capability of the symbolic actors in the virtual administration or educational environment (the administrator and the clients, or the lecturers and students);
- The possibility of a complete user experience (full-time administration or holding class), which corresponds to the level of the transformation[14] sophistication level of electronic administration in the respective EU directive.

In the light of the above, from the appearance of the office or school building to the internal administration or classroom spaces, the perfect copy of the original should be depicted in a three-dimensional graphical space. It was only the IT development of recent years that made such commercial graphic control cards possible that are needed for rapid application in average PC-s.

[13] CHOI, S. ET AL. 2003. *The Economics of Electronic Commerce* – MacMillan Publishing Company.
[14] The level of transformation a high level of e-government sophistication, following the information (displaying data), the transaction (one way online communication) and the interaction (two way communication) levels, according to the EU Directive 1999/93, which allows meaningful administration without the physical presence of both the client and the officer. However, this level relies on the transformation of the traditional workflow, hence its name. In electronic school environment, similarly, the transformation level requires the transformation, the complete change of the traditional educational methodology, and not only from technological point of view.

Figure 3. In the virtual reality space the students enter the school, the university resembling the original environment. They can see all the other students having entered the program simultaneously. They can communicate with one another in real time with text or sound, this latter possibility depending on the students' home PC quality (sound and microphone)
Source of images: Virtual Planet Hungary Ltd 2019.

Real time interactivity is essential for all the actors being present in the virtual educational space, so symbolic students and lecturers staying at the same virtual space can address not only the lecturer, but also one another. Not only is the three-dimensional school environment credible and genuine, richly detailed, according to reality, but also the forms of the virtual representation (the Avatars or actors) can carefully be designed.

Unlike 3D games, it is advisable to choose from a single set of nationally owned and managed administrations in order to preserve the seriousness of administration and training. Information sociology examines what social motivations and experiences the user applies to design personal Avatars and selections (CASTRANOVA 2001)[15], free choice based applications can create unwanted deviations in virtual administration and training. That is why Avatar choice has to be regulated and limited, unlike the practice of individualism allowed in business and 3D video game applications. The difference between the real and the virtual space is that in virtual reality the client and the student can appear in several virtual spaces simultaneously, collect information and interact in the image of their own symbolic representative (Avatar). Thus, the time of the client

[15] CASTRANOVA, E. 2001. *Virtual Worlds. A First-Hand Account of Market and Society on the Cyberia Frontiers* – CESIfo Working Paper Series 618, Department of Telecommunications, Indiana University, Bloomington.

and the student can be exploited multiple times without having to travel separately on this matter. Customer and student friendly administration or teaching belonging to the good state, to the good local government and to the good post graduate training of civil servants can be seen in such a service in the most spectacular way.

According to the survey of FÜLEKI (2008)[16], 80% of the world's most active Internet users (Fortune Top 500 players) have a virtual system and hundreds of companies and nearly 200 leading universities are now present in virtual or expanded virtual systems within the Second Life Universe, with their offices and classrooms. The spread of these synthetic spaces, their popularity, and their reputation make it increasingly urgent to regulate them, if they are going through real economic processes. This demand is increasing when interactive modeling of real time workflows of administrative processes, or teaching practices take place. Within a decade, current Internet applications are likely to be replaced by virtual or extended virtual spaces. WEB browsing is going to be replaced by the ability to get the information, entertainment, product, service you need in the virtual space.

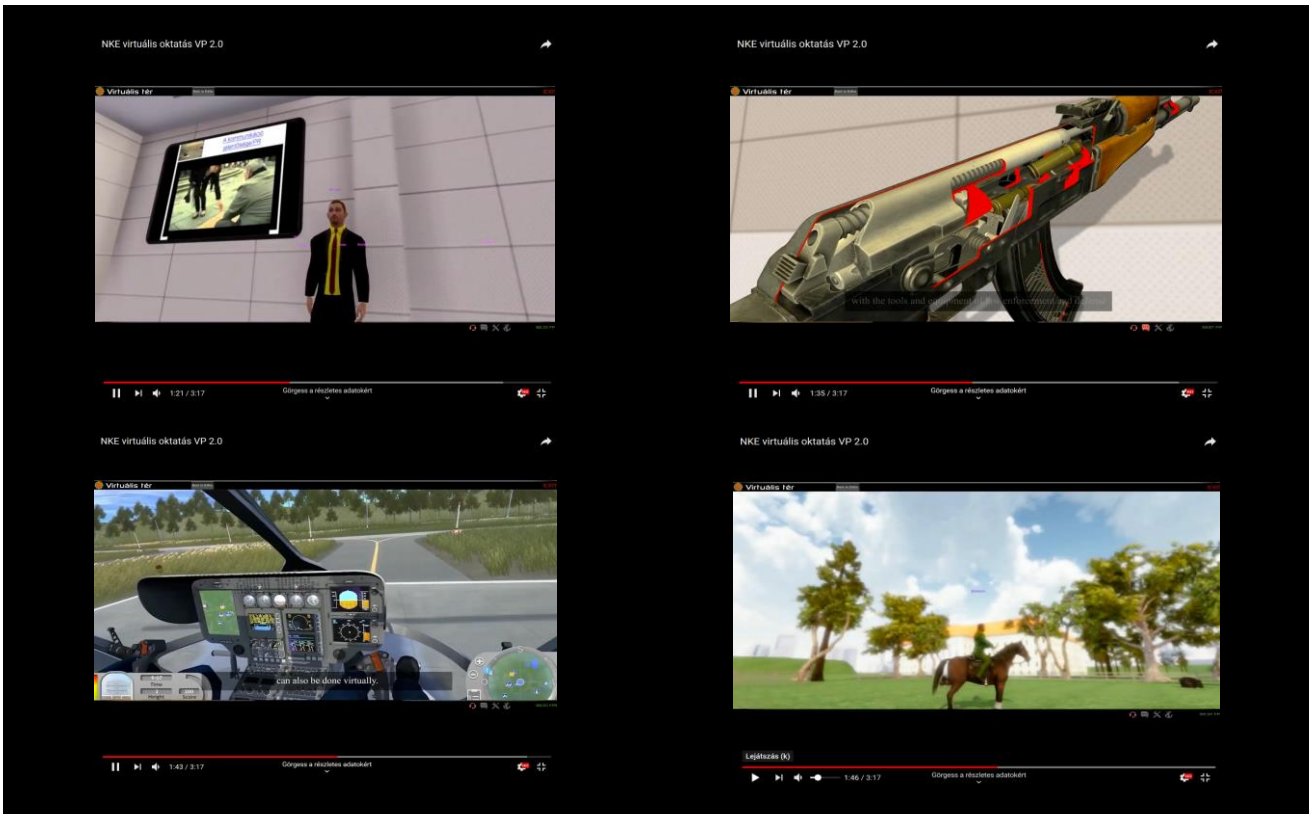


Figure 4. The virtual reality educational environment provides the lecturers and the students not only with real time interactivity in listening to the lecturer's presentation, but with the possibility to download the teaching materials from the lecturer's PC, making notes and even with the possibility to exercise the handling of different tools, like putting together weapons, operating expensive instruments and dashboards, saddling horses etc.
Source of images: Virtual Planet Hungary Ltd. 2019.

[16] FÜLEKI D. ET AL. 2008. *A magyar webes piac technológiai architektúrái – Technological Architectures of the Hungarian WEB Market* = Vezetéstudomány 39. 12.

Applying Virtual Reality in Local Government Post Graduate Training

It is an effective, modern opportunity for post graduate training in public administration, where traveling to training locations is also of great importance regarding money and time. Although the Center for Continuing Education of the National Public Service University has developed more than one hundred e-learning and distance learning programs, however, in many cases, students would prefer traditional printed text to online reading through downloading the textbooks. The 3D educational simulation environment is the first application of virtual reality in the training of officials. 3D tutoring can be an extremely colorful and popular way of studying as an accompaniment to any e-learning format curriculum.

Of course, the real breakthrough would be when the virtual classrooms and the educational environment appear in real time participation in the undergraduate training of administration managers. By doing so, prospective civil servants, not only think of second-life programs as video games, but also take for granted the use of virtual reality in their jobs, including administrative or public service developments. Further refinement of virtual reality programs is going to be the inclusion of android environment. Since all the students tend to use smartphones, the everyday practice will force the use of virtual reality in higher education optimized for android IT environment as well. Students thus will be able actively attend classes, lectures, or seminar on their smartphone, anytime, anywhere. . Their presence (attention) is logged by the automation built into the virtual reality system; they can take notes, they can download the presentation presented by the instructor immediately, they can ask in real time either by text messaging or via sound; they can comment, not only with the instructor, but can also chat with their fellow students who are simultaneously present in the system and who see each other through their named Avatars.

Structure and Installation of the Virtual Reality Educational Program

Definitions: (1) Virtual reality in this case means the 3 dimensional ‘game’ environment imitating the buildings and the rooms of the NUPS where lecturing can take place. (2) Client software in this case stand for the tool via which the user can enter the virtual reality and it can be run in Windows operational system using any display. (3) Avatar in this case is a human form representing and personalizing the users in the virtual reality.

Server environment involves a 'game server' using MSSQL[17] database in Windows environment ensuring the communication among users' clients and between user clients and the database. It has to be able to serve at least 90 users (students) simultaneously. Also, it has to be able to allow 400 pings[18] as user connections that can be extended to a larger number any time, allowing thousands of users (students) being registered in the virtual reality school.

Installation of the virtual reality program can be facilitated to personal computers and lap tops of both the lecturers and the students. (Smartphone installation is under development.) To use the training program, we need to download the 3D INTERNET browser. We have to click on a download link to install the browser. Recommended system requirement: CPU: 2 x 1.8 GHz, RAM: 2GB; VGA: 128Mb; free space: 600 Mb; Internet bandwidth: 2.5 Mbit/sec.

The requirements of the user side client include (1) the client equipped with the logo of the NUPS; (2) Windows operational system; (3) easy communication and mobility of the Avatars in the virtual reality; (4) visibility of all the users for all the users having entered the virtual reality program; (5) easy uploading of teaching material in any format (Word, Power Point, Prezi, You Tube, Excel, PDF /Portable Document Format/) by authorized lecturers; (6) easy text /chat/ communication among the students in the form of both private and group messages; (7) visibility and audibility of the lecturer's Avatar and voice by the students in the virtual reality program; (8) real time connection.

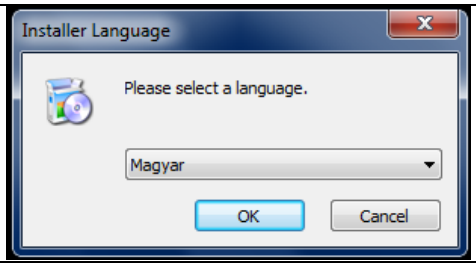
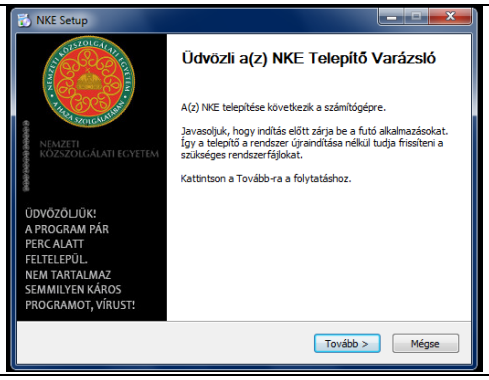
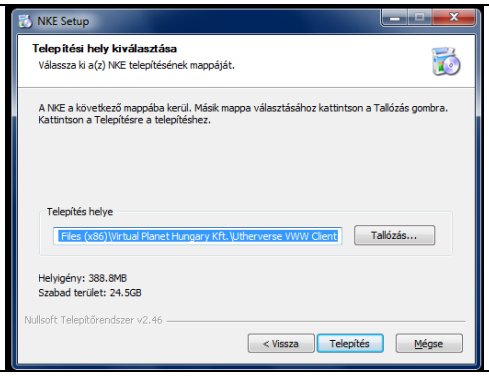
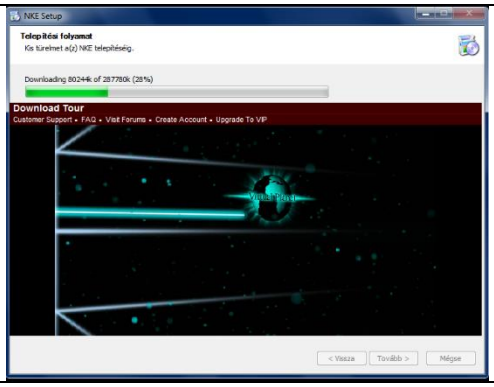
To achieve the above 8 criteria there are to authorization levels in the virtual reality program: (1) for the upload of teaching material for the lecturers; (2) for display and download of the teaching content for the students.

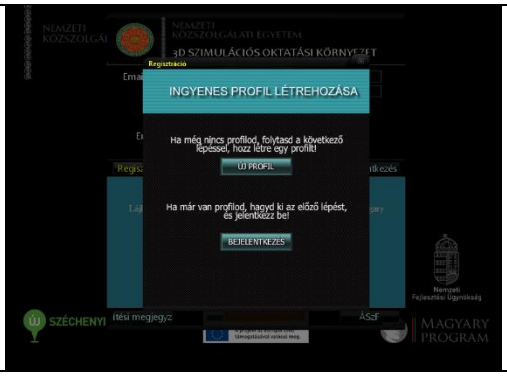
The WEB Site of the virtual reality program has to be designed with the profile elements of the NUPS. The site has to meet the following criteria: (1) communication with the MSSQL database; (2) the site and the game server have to operate independently so that if updating of the game server takes place, and the virtual reality cannot be reached, the site can inform the users about it; (3) there has to be a welcome and an introduction text present on the homepage of the site; (4) the website also has to have a registration subpage both for the lecturers and the students, and a subpage to download the program; (5) the website has to have another subpage with the frequently asked questions, the contract between the operator and the University, and the data protection information.

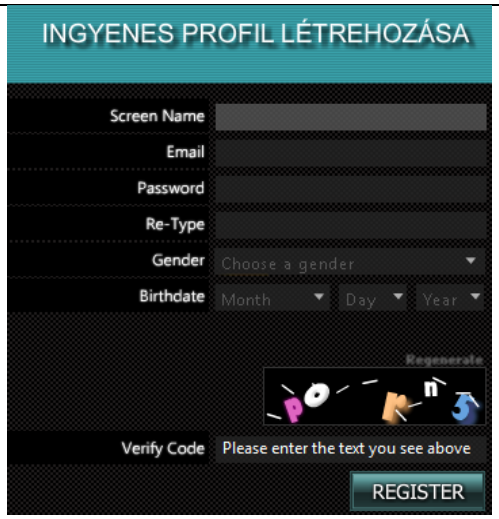
[17] Microsoft SQL (Structural Quality Language) Server is a relational database management system with the primary function of storing and retrieving data as requested by other applications which may run either on the same computer or on another computer across Internet.

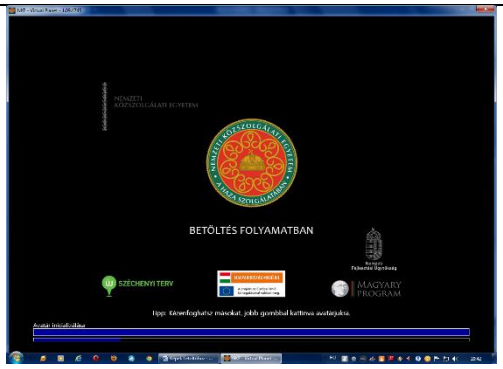
[18] Ping is a program allowing the user to verify that a particular IP (Internet Protocol) address does exist and can accept requests. It is important in the identification of the students, as users.

The installation of the virtual reality program step by step:

The first step in the installation program is to download a Setup file, after which the installation language can be selected.	
After selecting the language, the Installation Wizard will appear, which will show you the installation of the browser step by step.	
The Installation (Telepítés) Wizard selects the location of the installation, it is recommended to choose this location, so it is advisable to check that there is enough free space in the target area before starting the installation.	
The installation starts, it can take a few minutes with a device with the specified system requirements and Internet bandwidth of about 10-15 minutes.	

Click Finish (Befejezés) to complete the NKE 3D browser. (NKE = NUPS)	
If you want to start the browser right away, you can click on the Start (Indítás) button in the window below, or you can click the NKE icon in the Start menu or on the desktop at a later time.	
When you first log in, the registration interface opens automatically, and the next step is to select Registration (Regisztráció). The next time you log in, you will be able to log on to the same interface.	
It is necessary to create a profile to use the training program and perform the tests by selecting the New Profile (Új profil) option in the window below.	

The NUPS virtual reality system automatically fills in the e-mail address line based on the data of the loggers, and it is enough to enter the password and continue registration. To confirm the password, select the 'Re-Type' menu item, i.e. the same password again. Gender, Birth date is followed by the Verify Code, which helps the system to operate safely. Click Register, i.e. registration, and the training program is ready for use.	

After the registration is completed, the program can be started, or at any time by clicking on the Start menu, or the NKE (NUPS) icon on the desktop as described earlier. After loading, the user arrives in the 3D educational environment, so this part of the process is completed, and more information is available there.	

Using the Virtual Reality Program

The use of the system is simple, logical and easy to learn, after some basic information is obtained. Each student is also a user of the system, who is represented and impersonated by an Avatar in the system and can simulate situations in a virtual education environment with practicing tasks on the basis of pre-written scenarios and expectations.

After registering, downloading and logging in, the student will come into the virtual reality model environment answering reality; in this case it is possible to perform the tasks, but first the student has to familiarize herself or himself with managing the Avatar used, as a tool to perform the task. All users see the basic information on the screen for orienting and moving the Avatar on the opening screen.

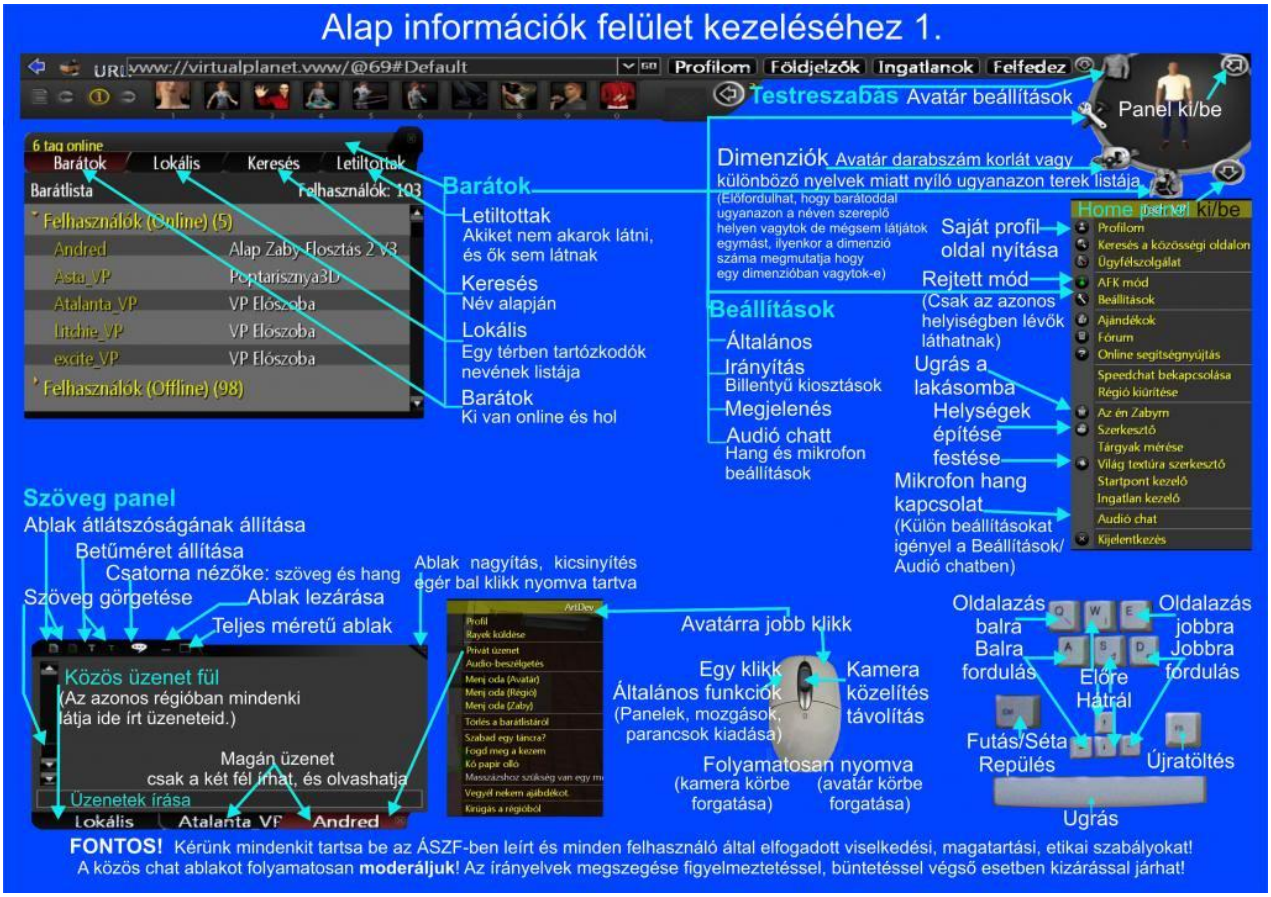


Figure 5. The operation screen for navigating the Avatars in the virtual reality program (Source of the image: Virtual Planet Hungary Ltd.)

Navigation

Control can be done using a mouse or keyboard. When using the mouse, the following functions are available: Left button: one-click functions (issuing panels, movements, and commands), rotating the camera with a continuous click even horizontal and vertical, using the mouse to determine the directions. Right Button: view your profile page when you click on another user, rotate the Avatar in horizontal and vertical directions, and then use the mouse to direct the route. If both buttons are pressed at the same time induces straight forward movement and in this case move the mouse to the left and right to change direction. Middle scroll button: camera zooming up to the inner perspective, in which case the Avatar is not visible. The above features are available when using the keyboard: basic functions: Q, W, E, A, S, D keys. Q - Sideways left; W - advance; E - sideways right; A - left turn; S - backward movement; D - turn right. Progress forward, backward, right, left is also available with the arrow keys on the keyboard. Other Functions: K - camera zoom; L - camera tracking back; CTRL - run / walk change; F2 statistics; F5 - recharging; F6 - friend list; F7 - setup options.

Dialogue Setting

The chat window that appears in the bottom left corner of the start page displays the dialogues, the settings of which are from left to right: adjust window transparency; adjusting letter size; channel viewer (text and sound); closing the window; full size window.

The icons for the settings are located in the top right corner of the home page. For use, it is essential to adjust the settings to the local technical characteristics of the user. If you have the right technical equipment, that is, the right PC, and you have a high-speed Internet connection, you can choose the highest offered options in the general settings with the Maximize FPS and Text Filter settings. However, the available technical tools may be less than the recommended machine requirement, or the Internet speed may be lower, and in such cases the service will be available in the above settings by lowering the offered options. The down arrow in the upper right corner of the screen contains several menu items you need to use. The student can also open their own profile page or access customer service.

Description of the End-User’s Helpdesk

Educational simulation in a virtual reality education environment works on the Internet, so there may be interruptions or errors during use, which can be caused by several causes. As the service provider, the Virtual Planet Hungary Ltd. provides continuous technical and technical assistance to students and lecturers, i.e. users. The procedure for registering error and malfunction reports with the Virtual Planet Hungary Ltd. as a provider for troubleshooting is as follows. When reporting a fault, the user is obliged to provide all the phenomena that are essential for identifying the error. The error notification must include the user name; the user ID; the best possible description of the problem; the time of the error. The service provider confirms the error report to the user and registers it besides recording it. The error record contains: (1) the user ID; (2) the description of the problem; (3) the date of the error report (year, month, day, hour); (4) the measures taken to determine the cause of the failure and the results thereof; (5) the cause of the error; (6) the manner and time (year, month, day, hour), the result (or the ineffectiveness and cause thereof) of remedying the defect; (6) the manner and date of the user's notification. The service provider shall investigate the error reports within 48 hours after the completion of the complete error report as described above and shall notify the user on the basis of the completed investigation. The time elapsed between the correct reporting of the error and the correction of the error shall not exceed 72 hours. The service provider is not responsible for any defect or quality loss due to improper or misuse of the service

Teaching Material Management (for the Lecturers)

The lecturers use the virtual learning environment and the associated profile system to summarize and evaluate students' results. In order to use the system, the lecturers need to know the interface as well as the students. After registering, downloading and logging in, the lecturer arrives in the virtual reality environment, modelled according to reality. The down arrow in the upper right corner of the screen contains several menu items the lecturer needs to use. The lecturers can also open their own profile page and can have access to the customer service here, too.

Achieving Results

The lecturer can access to the results stored in the student's profile page. Students' profile pages can be opened in several places: (1) in the virtual reality education environment, the right click on the student Avatar describe previously, choosing the option to open the profile. (2) By selecting the search function on the virtual reality education page and entering the profile after entering the specific student's name. (3) Using the search function on the lecturer's own profile page, opening the profile of the selected student. The lecturer can track the students in the virtual reality education environment, produce statistics on their activities, and list their results. Unlike 'traditional' e-learning and webinar devices, it is possible in the program to track automatically the students' activity during the classes. Such case is the listing of the students' responses to questions during the lecture, or monitoring the movements (or the lack of movements over a given period of time) of their Avatars. This means a new perspective in controlling the attendees' attention in distant learning courses!

Receptiveness of Virtual Reality in Post Graduate Training of Public Servants

The frequent argument for introducing e-government is to support the disadvantaged or time-consuming groups to be able to access administrative services without personal appearance. However, research on the information society has also shown that bridging the digital divide between digital literate and illiterate people, even in well developed countries, is not a generational issue; layers that do not use the Internet are continuously being reproduced. These disadvantaged groups are the unemployed and the elderly. In the opinion of the document office managers, only a very small percentage of the citizens are likely to use the possibility of electronic administration in Hungary. In addition to the electronic workflows required by law, such as the VAT declaration, citizens use the options most of the time for a single appointment. This is true for the younger age group using the Internet on a daily basis. However, the three-dimensional administration option is 'interesting' enough to attract netizens (who are not, or only slightly using e-government) into using e-government services in virtual reality offices. That is why

virtual reality appearing in post graduate training of civil servants of the local governments can act as a totalizator of innovation for the students.

Information warfare has also changed a lot in the past decade. While information systems have been the primary targets for information attacks, the user has become the primary target in recent times. In addition to old, proven methods of attack (such as flyer, loudspeaker, radio, and television), the new peak weapon is the spread of virtual reality that can create drug-like addiction and influence (SIK 2009)[19]. When a customer enters the customer service of an administrative office in the form of an Avatar-form, this is not only customer-friendly, more convenient, but also entertaining. It can give the user (either a customer or a student) a game experience. In post graduate administrative studies this experience could help in recognizing the nature and technological basis of addictive video games that can be used as the carriers of hidden, hostile content. All this can contribute to the administrative content and educational function implemented with the help of virtual reality and it will also promote the long-awaited spread of electronic administration in line with the EU expectations.

Figure 6. Choosing and dressing up virtual reality Avatars that can be used both in post graduate training of civil servants and in public administration, just like real time dressing, requires caution, which will be enjoyed by students, lecturers, customers and office staff alike as a game experience! (Source of the image: https://join.secondlife.com)

The choice range of client-manager Avatar figures that can be used in public administration and post graduate trainings, must be limited in order to preserve the seriousness of public administration and university training, as the forms of the figures in second life universe games are endless and fantastic.

Not only can the user create clothing, the appearance of the avatar, the look, the make-up, but in addition to providing a gaming experience, the less digitally literate users can be engaged more closely in the modern trends of information technology of the WEB 3.0.

[19] SIK Z. N 2009. *Információs hadviselés – Information Warfare*. E-Government Tanulmányok. XXIX. E-Government Alapítvány, Budapest.

Data security for administrative and educational applications of virtual reality can be guaranteed with the same pre-registration pin codes that electronic banking uses - in the case of personal identification as part of the workflow. Administrative development of virtual reality is incremental, and in the first phases, only customer information, interactive forums and work meetings are realized, where there is no need for data and personal data protection.

As NEMESLAKI (2012)[20] states, existence in WEB 3.0 Internet synthetic worlds will no longer be just a recreational video game, but an everyday activity that will become as natural as the notebook, the Internet or the smartphone usage today. And as these tools 'only' accelerated the rhythm of life, but did not lead to social alienation, the use of virtual reality will only serve our convenience.

Visualization of NUPS Virtual Reality Pilot 2018[21]

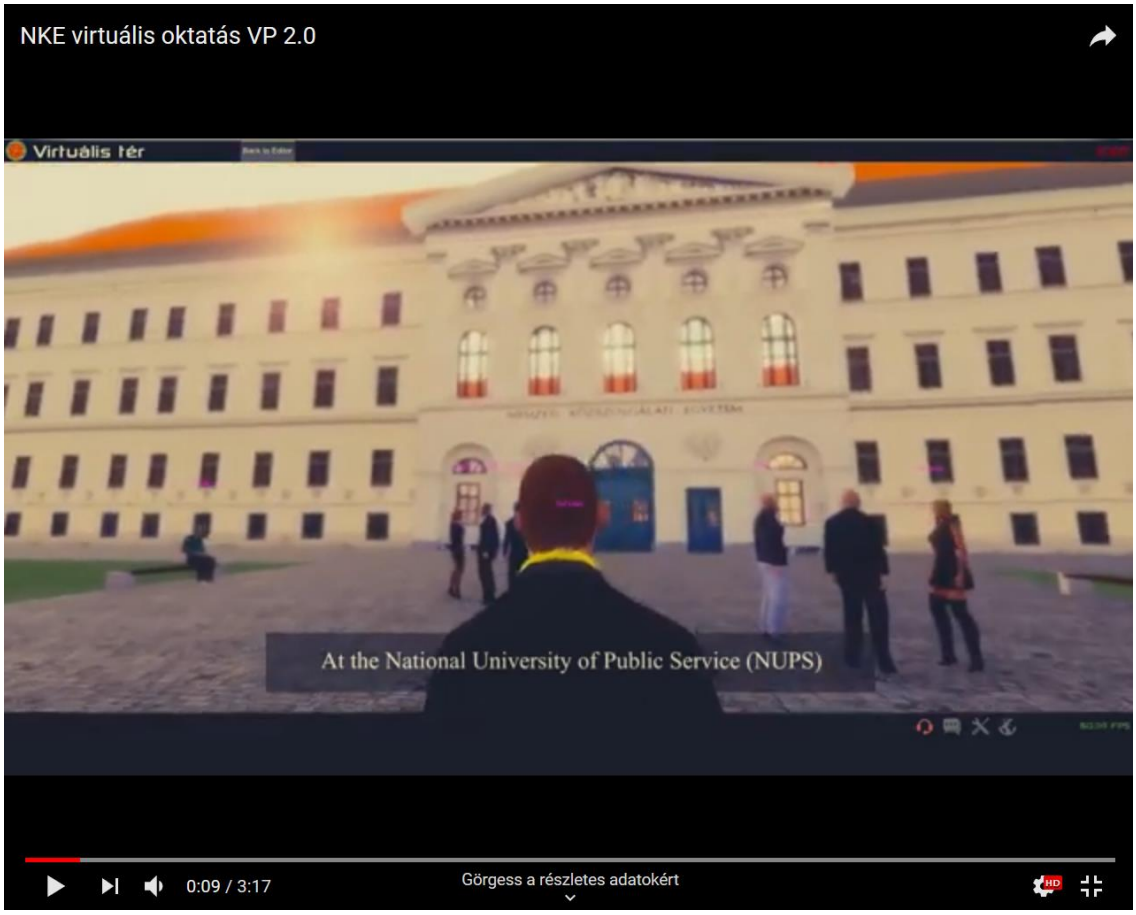


Figure 7. The central building of the NUPS

[20] NEMESLAKI A. 2012. *Vállalati internetstratégia – Corporation Internet Strategy*. Budapest, Akadémiai Kiadó.
[21] Source of the images: https://www.youtube.com/watch?v=ICu_5xtFz-k

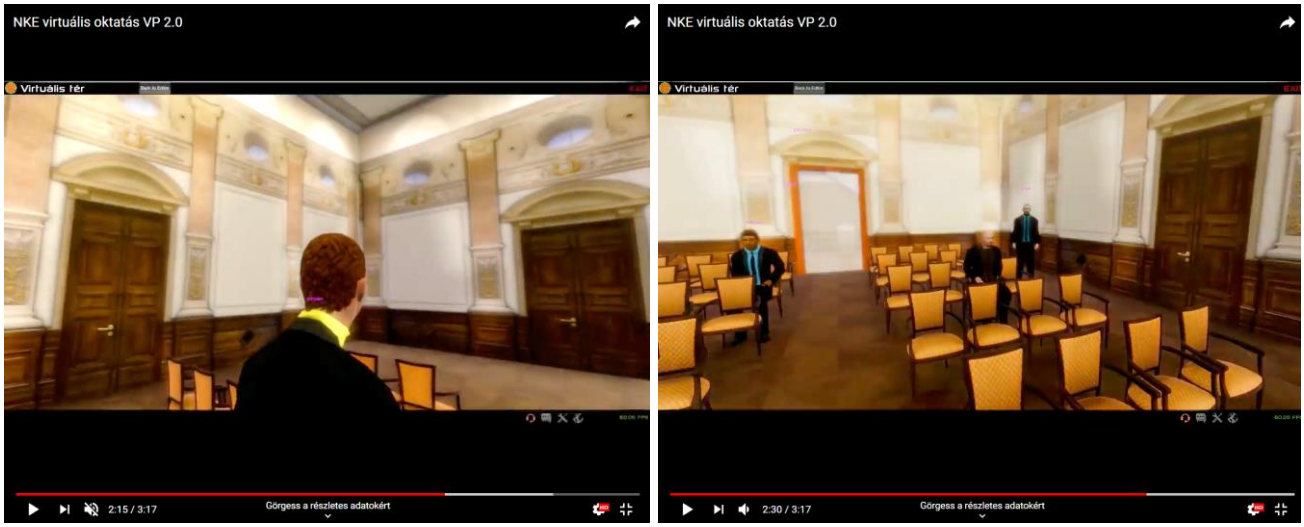


Figure 8. The Ceremonial Hall of the NUPS

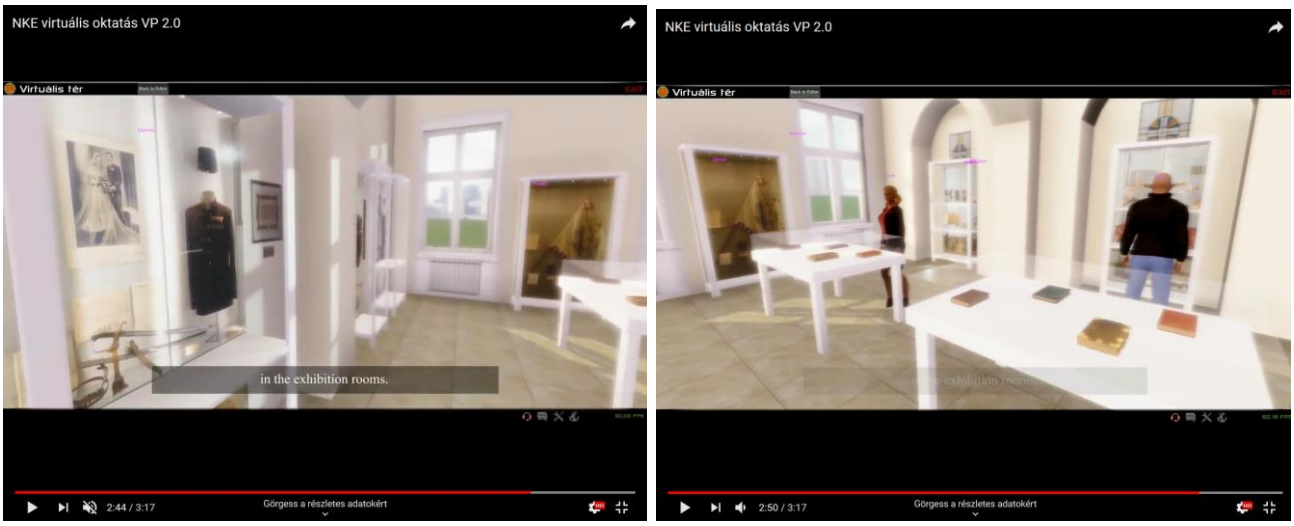


Figure 9. The Exhibition Room of the NUPS

Figure 10. The Chapel of the NUPS

Figure 11. The inner yard of the NUPS

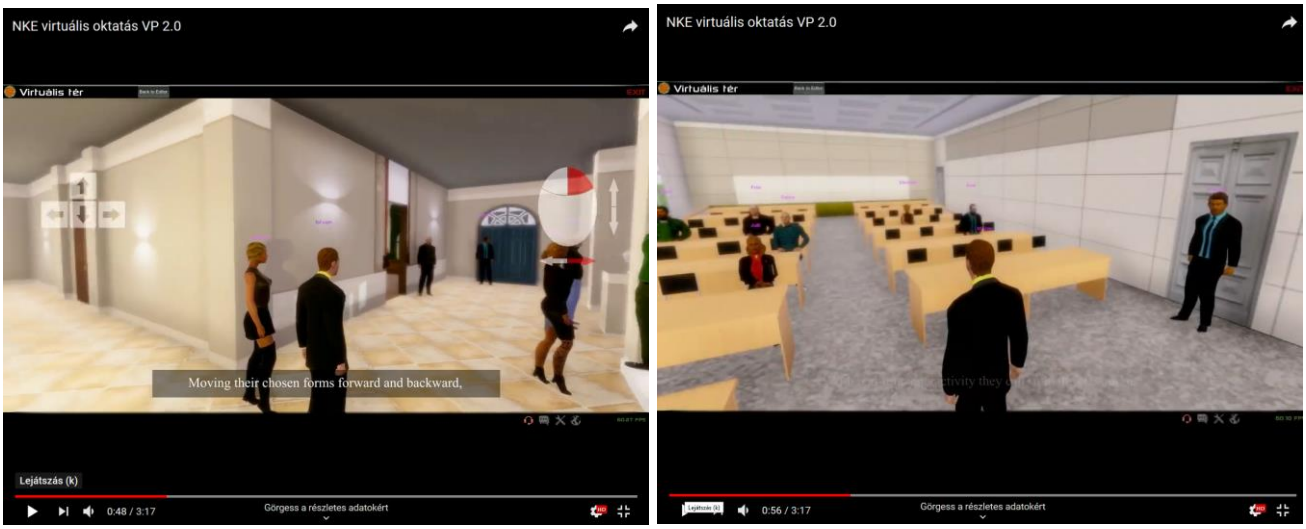


Figure 12. The corridors and the classrooms of the NUPS

Figure 13. The first pilot with six teachers sitting in the classroom and listening to Professor Tózsa's lecture in 2018 at the NUPS

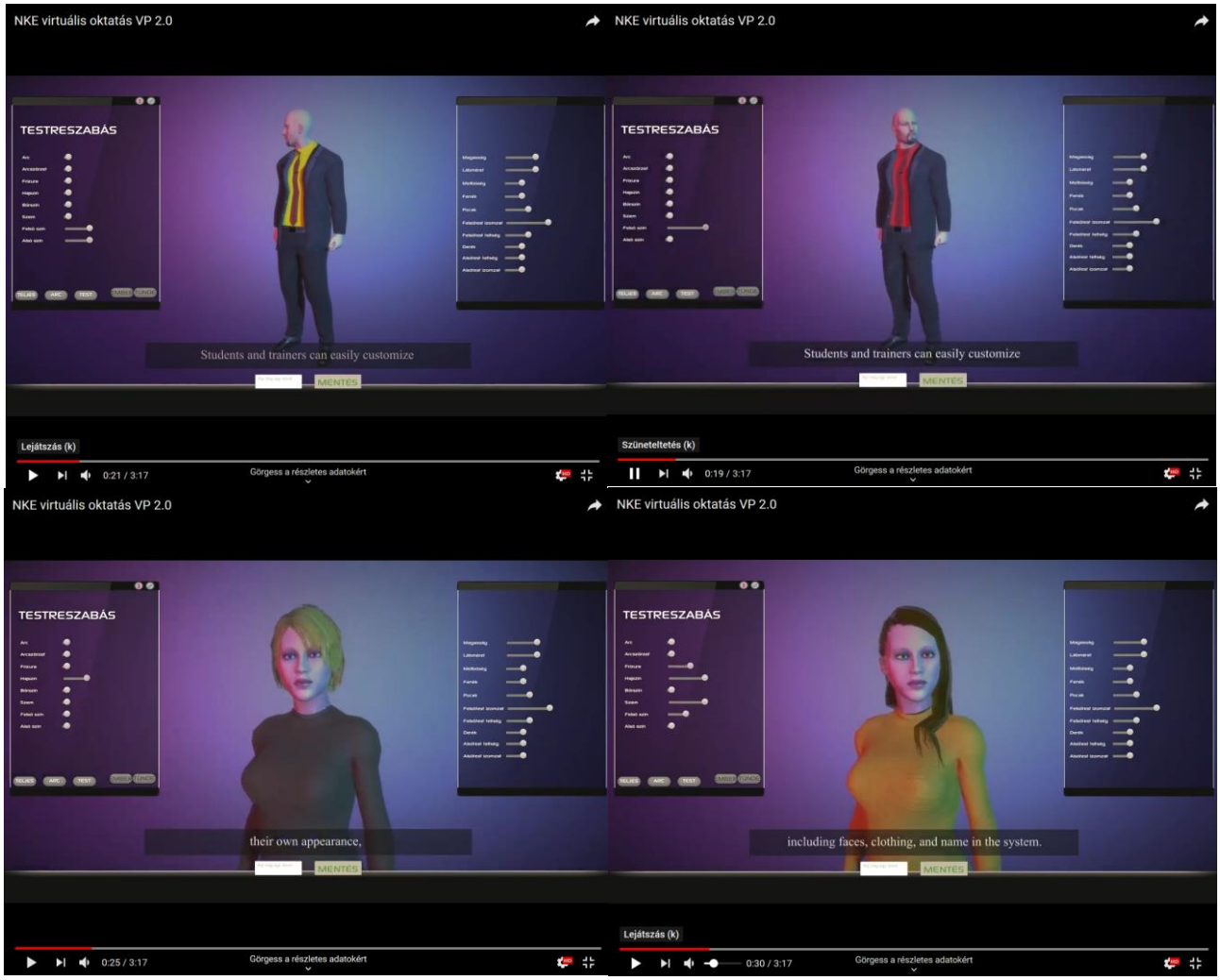


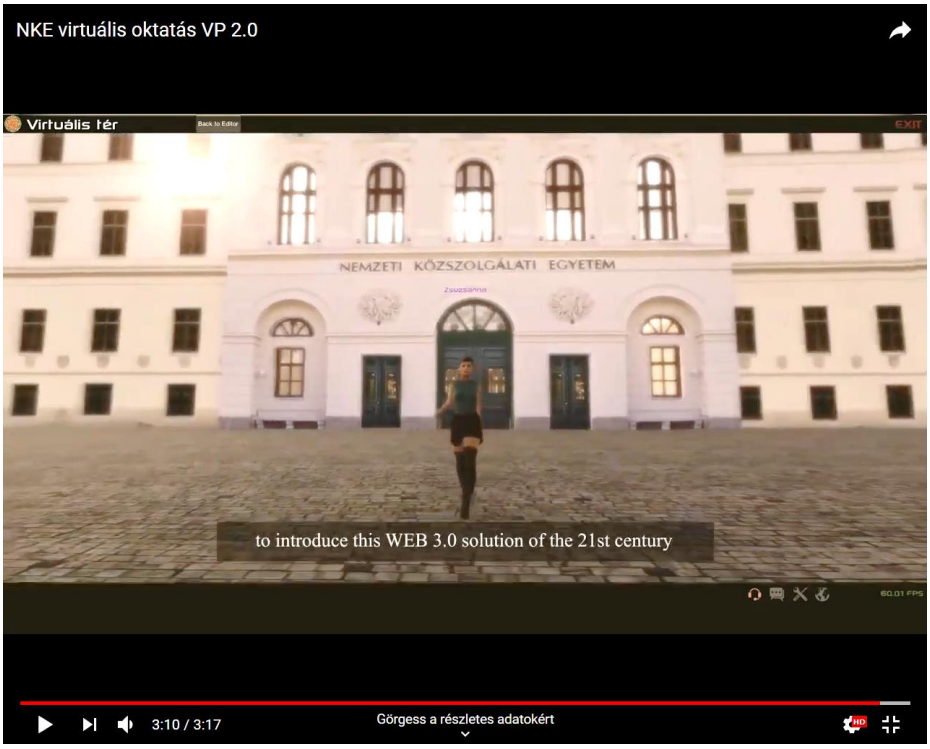
Figure 14. Customizing the Avatars of the users of the virtual reality program at the NUPS

Summary

This program designed first of all for the post graduate trainings of the National University of Public Service, Hungary, offers a possibility to take distant learning courses from the toolkit of WEB 3.0 opening up a new horizon for e-learning technologies.

With the game experience added to learning and remote course attendance it also helps public servants to be aware of the new technologies, thus paving the road of the acceptance of innovation.

Note 1. contains the opinions of the lecturers having taken part in the pilot lectures held by the Author of this study at the NUPS in 2018.



Notes

Note 1. Lecturers' Opinions about the Pilot of the Virtual Classroom Application at NUPS in 2018

In June 2018, Virtual Planet completed the creation of the virtual reality environment for the NUPS, not yet for the students, but as a pilot for the lecturers working for the Department of Public Management and Administrative Studies. They became as familiar as possible during a few classes with the virtual education system. As it is still in the development phase and is only ready for a students' pilot in April 2019, the first instructor impressions at the end of this study are the basis of further refining and improvement.

How did you like the virtual classroom educational method?

1. There are very good opportunities for virtual (distance) education, many universities or educational institutions already offer online courses (including Stanford, Illinois, John Hopkins or IDF). I also attended such a course. In these online courses (even in some suitable presentations), the instructor provides slide shows, additional videos, and written material on the subject, along with the video show. The advantage is that the entire net is immediately available to illustrate any issues that may arise. After the pre-broadcast, you have to answer a few questions or develop a smaller project, homework, other written or training material that the supervisor evaluates. These surfaces are very simple and easy to view. If this pilot application is suitable for the above, it will provide a truly exciting opportunity for education

2. I attended all three training sessions, but I still don't have enough information to answer this question. For example, it would be good to know what similar applications are available in other universities around the world and how effective and successful they are.

3. I find the basic concept (i.e. that the lecturer has the opportunity to take the class in the virtual space) as a whole very innovative. However, the program itself could be simplified here and there. For example, I did not consider it necessary to start the program in front of the main building of the NUPS, to approach the room in a running mode and so on. (Instead, the lecture could start immediately by clicking on a virtual room.) A giggle reminiscent of such a video game program might inspire students' interest, but I feel a bit redundant in the case of the instructors

Do you think it will be applicable?

1. The added value is determined by the added value: how much more is it if we enter a 3D classroom online, wait for the instructor to arrive online than if we watch an educational video anytime-anywhere, read the tutorial with the accompanying presentation material, pictures, etc. together? What contents and how easy will they be (with a few clicks) available? If the members of the pilot group can already know the management of this 3D surface they are using, they will move with confidence, and the whole system will be easy to use, then it is imaginable!

2. I do not know at this point I think it will not be applicable

3. It is sure, though not only for the trainers but also for the students, to have a change of learning process. The method of optimum knowledge acquisition in virtual form, I feel, should be taught in a separate (introductory) course for the Z generation, e.g. between the basic subjects of the BA program. (For older people, this is valid even more!) There would be great dangers if students were thrown into the ‘deep water’ without any preparation.

If so, for whom in the first place?

1. To whom the course is advertised by the University. If the interface is easy to use (if it does not require downloading difficult additional programs to understand the course, or preparations, downloading further documents) then, there could be complete courses held.

2. From the foregoing, the virtual method is most promising for the younger generation who are not part-time students. If the NUPS is able to gain a competitive advantage over

its competitors in the field of virtual education, it can significantly increase the number of students coming here, and indirectly the prestige of the university!

What do you think the advantages are in the program?

1. You do not need to be personally present for education, the material is accessible at any time and from anywhere, on any surface (also on a tablet or mobile). They are benefits of the program.

2. Its advantage is the game experience, playfulness and overcoming the distance.

3. This form of training is particularly beneficial for students attending correspondence and other specialist post graduate training courses. For example, they do not need to take leave from work and/or travel 100 kilometers on a training day. In addition, the lessons in the virtual space will also enhance the digital competences of the students.

What do you think the disadvantages are in the program?

1. Preferable areas: What kind of interface is available? Preliminary teaching will be required (rather problematic), or will the surface be more understandable than this is now?

2. Based on the little information we have so far, the interface is cumbersome and complicated, and I do not know what options are available for planning and implementing routine occupations and courses.

3. This program easily can discourage students from physical appearance in the classes and, in particular in the case of inadequately motivated students, it can lead to 'cheating'. Even in case of lectures with a large number of students attending, there are often several students who are pressing their mobile phones and not really paying attention to the lecture. On this basis, it is realistic danger to expect that a student in a virtual form (and thus less controllable) will only be present in the form of an Avatar.

What should be changed in the program?

1. The currently available user interface is difficult to understand, each step must be searched for, and the operation of the interface must be seen. In many places, the program does not meet the traditional users' expectations. 3D is a less realistic and not standard solution among the online applications I know. It is possible that there are several such 3D online courses, but I don't know about them. For the time being, however, the surface seems more cumbersome than useful. At the same time, supplemented with additional useful features (useful for the target group), it can be more useful. In terms of the surface, there is no developer, not even the surface, especially with regard to the

user's abilities, habits, and basic expectations. You should pay attention to this if you want students to use it with joy and compulsion. In addition to the difficulty of the general surface, it is important to note that the projected images (in PPT format) are too small, approximately 1/9 part of the monitor. On-line training courses can be used to view images and videos in full size and zoom in on screen size. Typically, more readable text information is available for the materials. Access to content is easy everywhere. In online training, the actual user's presence is not realistic; users prefer to use the option to look back, listen to and read the teaching material any time. The system can be good, if the material of the lectures can be viewed later (The Author's remark: it can.) The student does not experience any constraints either in space or in time, which is good in the program. At the end of the training, there are typically 2-3 control questions, which I recommend to complete the current lecture. The advantage of training with a personal presence is that participants can ask the instructor questions. You can do this on the interface shown in the chat window. There are common online chat windows in the sample games, where the participants can communicate with each other.

2. I do not know enough about the surface yet. One thing is sure: user-friendlier solutions should replace the present traditional practices in education, therefore teachers and students should learn to manage the interface with less time.

3. Certain functions (such as the possibility of uploading a werewolf type Avatar) may be more of a risk to the students than their interest. In addition, I would like to increase the use of non-frontal applications in the program, e.g. possibilities of supervising teamwork by the instructor. (The Authors remark: the extraordinary figures are taken out of the stock in the program.)

What was difficult in the pilot? (Beyond the lack of microphones, suppose they will be available.)

1. It was fine for me everyone was very helpful.

2. Using the interface without requesting assistance.

3. It's a rather complex program. It would be necessary to distribute a users' manual to the instructors before the next session, or even before we can regularly update our newly acquired knowledge.

How do you think the undergraduate full-time students will relate to it?

1. If you have access to meaningful materials, you can do well. Perhaps experienced gamers among the students are more accepted.

2. Difficult question. There is a risk that some of the undergraduate students think they will not have to go to class at first. To overcome this, awareness-raising is needed e.g. through the use of a virtual courses and classes in the field of virtual education, or through positive incentives for participation in an active lesson in virtual education. It should be noted, however, that in the case of full-time students I do not consider it appropriate to replace totally the personal appearance in the near future. The best virtual program also limits the available communication channels. In my opinion, virtual education should only be introduced for one or two subjects in the first instance, and in practice it should test its dangers.

In your opinion, how will correspondent and post graduate students relate to it?

1. If you have access to meaningful materials, you can do well. Perhaps experienced games are more accepted.

2. In the case of the correspondent students, I find virtual forms of education very useful for students who mostly work (often with a family) are overwhelmed, spending a lot of their time and money on traveling, and traveling costs. In their case, especially for the older generation, the low level of digital literacy can be the main problem. On this basis, caution (the gradual introduction of this form of education) is also very important here.

Note 2. Reach a New Dimension of School

In 1970, one of the major pop music hits was released by the very popular Illés Band (the 'Hungarian Beatles'); with the title: *Élünk és meghalunk* (*We live and die*), and one of its paragraphs which meant to express something impossible, went:

„Valahol egy iskola,	*There's a school somewhere,*
Nem is olyan nagy csoda,	*Though not a big miracle*
Belejár a kisgyerekbe,	*It goes to the pupils,*
Nem a gyerek jár bele	*Not the pupils go*
Az iskolába	*To the school."*

After 4 decades, however, it does not sound to be a big miracle.