Virtual reality in foreign language training at higher educational institutions

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Abstract. The paper deals with the urgent problem of application of virtual reality in foreign language training. Statistical data confirms that the number of smartphone users, Internet users, including wireless Internet users, has been increasing for recent years in Ukraine and tends to grow. The coherence of quick mobile Internet access and presence of supplementary equipment enables to get trained or to self-dependently advance due to usage of virtual reality possibilities for education in the stationary classrooms, at home and in motion. Several important features of virtual reality, its advantages for education are discussed. It is noted that virtual reality is remaining a relatively new technology in language learning. Benefits from virtual reality implementation into foreign language learning and teaching are given. The aspects of immersion and gamification in foreign language learning are considered. It is emphasized that virtual reality creates necessary preconditions for motivation increasing. The results of the survey at two higher education institution as to personal experience in using VR applications for learning foreign languages are presented. Most students at both universities have indicated quite a low virtual reality application usage. Six popular virtual reality applications for foreign language learning (Mondly, VRSpeech, VR Learn English, Gold Lotus, AltSpaceVR and VirtualSpeech) are analyzed. It is stated that the most preferred VR application for foreign language learning includes detailed virtual environment for maximal immersion, high-level visual effects similar to video games, simple avatar control, thorough material selection and complete complicity level accordance of every element and aspect, affordability, helpful and unobtrusive following up.

Keywords: Virtual Reality, Foreign Language Learning, Virtual Reality Application, Immersion, Gamification.

1 Introduction

Information and communication technology (ICT) is an inseparable part of lifestyles of modern people, especially of adolescents and young adults. In Ukraine, dependence on its benefits has been limited to person-to-person communication and information acquisition for decades. Nowadays, Ukrainians tend to enlarge the list of their demands towards IT due to massive switch to smartphone usage and because of the mobile Internet services have been rapidly advancing and expanding recently.

As it is reported by RBC-Ukraine with reference to the State Statistics Service, the number of mobile subscribers in Ukraine was 53.9 million people (January 1, 2019). According to the statistics, the number of Internet subscribers increased by 10.3% (by 2.435 million) to 26.067 million for one year. The number of subscribers of wireless Internet access has risen by 14.4% (by 2.515 million) within the year to 20,024 million people [31].

The findings of the Kantar TNS Founding Study confirm that the number of Internet users in Ukraine has increased by 7%: currently 70% of Ukrainians use the World Wide Web (compared to 63% as of December 2017). According to the survey, 74% of Internet users use a smartphone to access the Internet, and 45% of users call the smartphone their primary device. Compared to 2017, these figures have increased by 18%. In 2017, 56% of users used the smartphone to access the Internet, and they were the main devices for 27% of users [12].

The statistical data given above confirm that the number of smartphone users, Internet users, including wireless Internet users, has been increasing for recent years in Ukraine and tends to grow. Availability of the Internet access allows users to get necessary information in every professional, academic and business sphere, e.g. to telework, to keep in touch with their partners and to study independently both inland and abroad. The coherence of quick mobile Internet subscription and presence of supplementary equipment (such as headsets, gamepads, frontiers) enables to spare both time and money to get trained or to self-dependently advance due to usage of virtual reality possibilities for education in the stationary classrooms, at home and in motion.

2 Virtual reality in education

The main feature of virtual reality is its dual nature: it is used both for reproducing real environments and creating invented scenarios which in turn enables the combination and recombination techniques for VR implementation in study and entertainment.

Carl Machover, past president of the National Computer Graphics Association, defines virtual reality as “an industry in its infancy’ [16]. He analyses several important VR features, it is important to stress the following ones to support the relevance of VR benefits in education:

- ability to evoke fiery discussions in the technical community;
- ability to trigger passionate involvement of the humanities resulting from tight connection to the human senses;

- uniqueness in its emphasis on the experience of the human participant;
- focusing the user's attention on the experience while suspending disbelief about the method of creating it.

All mentioned above features are student-focused and enhance study results due to motivation and the interest increase.

Mehraza Alizadeh outlines even more advantages of using virtual reality in education: 1) providing numerous reality representations by immersing learners in virtual learning environments; 2) representing the natural complexity of the real world by exposing learners to immersive content; 3) focusing on knowledge construction by interaction between learners for finding out the facts on their own; 4) presenting tasks by virtually putting learners to different contexts; 5) providing real-world, case-based learning environments by allowing for personalized learning of different learning styles, paces, individual learning paths; 6) fostering reflective practice by appealing to visual, aural, tactile, and other different senses; 7) enabling context- and content-dependent knowledge construction by providing context-rich content and gamified problem-solving tasks [2].

According to Jeremy Bailenson, Founding Director of Stanford University's Virtual Human Interaction Lab, the training of focusing a participant's attention on the definite subject or principle is exactly one of numerous benefits of VR application: "Unlike learning from a book, video or lecture, in the immersive environment that VR provides, you learn firsthand where to direct your attention, what consequences your actions will have and even how to talk to another person" [4].

Researchers Lesia Dashko and Oksan Dubytska put forward the idea of VR irreplaceability within educational process and its superiority over traditional teaching methods. VR enables a student not to imagine but to feel scenarios, situations, subjects which are not affordable or even possible to be recreated in a classroom [7].

Taking into account numerous benefits of its application, virtual reality is being widely used for numerous education purposes and studying different disciplines: virtual traveling, language learning by immersion, practical skills training and experimenting, philosophical theory testing, architecture modeling and design, education for people with specific needs, distance learning, improvement of collaboration, game-based learning, and virtual campus visiting [29].

Virtual reality is remaining a relatively new technology in language learning. Euan Bonner and Hayo Reinder insist that slow rates of virtual reality introduction into the language education are "to the fact that teachers are reluctant or intimidated by incorporating VR-powered learning tools and resources into their classes" [5].

This situation can be explained by a lack of literacies or a low level of certain literacies, which both teachers and students possess. Howard Rheingold puts emphasis on the significance of digital literacies for human personal empowerment, learning efficiency and further professional successfulness. According to Rheingold, "literacies are where the human brain, human sociality and communication technologies meet" [26]. Two of the mentioned above (human brain and communication technology) have pivotal role in VR functioning. The third component is the desired result from

VR application into foreign language teaching – students' ability to socialize in everyday, professional and business-like situations.

Rheingold also names five fundamental digital literacies: critical consumption of information, network smarts, participation, collaboration and attention [25]. All of them are either required for complete VR immersion or are trained in simulated environments.

The award-winning education technology specialist Paul Driver enlists benefits from VR implementation into language learning and teaching as following:

- VR links learning with the demanded context and makes learning activities situated;
- physical activities of the body within VR are as much important as current mental processes; Paul Driver names this coherence as "Embodied interaction";
- VR ensures users' active control over their moves and directions;
- VR and digital games provide "Spatial Affordance" hence they are the most spatial form of media available to use in language training [10].

Viktorija Dobrova and Polina Labzina emphasize the following features of VR they consider to be crucial for opting for using it in foreign language teaching:

- relevance: virtual objects exist only in the current virtual framework;
- autonomy: the laws of virtual objects existence do not coincide with the existence laws of reality that generates them;
- derivativeness: objects of VR are produced by the activity of some other reality external to them, and exist only as long as original activity lasts;
- interactivity: virtual objects can interact with the reality that generates them as ontologically independent of it;
- ephemerality: virtual objects are artificial and mutable;
- non-material impact: not being material, virtual objects can produce effects similar in their characteristics to material objects;
- fragmentation: freedom of entry into virtual reality and freedom of exit from it provides the possibility of voluntary interruption and resumption of its existence [9].

The practice of immersion into virtual environment in foreign language learning will enable students to feel themselves an integral part of the professionally oriented situation which is designed specifically to prepare the course participants for communication within. Having their legends and terms of existence within VR task students both get used to psychological challenges and apply existing speaking skills in a foreign language to perform their roles stipulated by the tasks. Educational activities in VR encourage spontaneity and therefore entail the maximum possible immersion of every single or multi-user within virtual environments. If successful, promising task performance increases students' interest in following tasks and their motivation to achieve better results in a training course expands.

VR application solves the problem of immersion in the language environment, psychologically prepares students to use existing professional skills and knowledge and motivates their further study. VR based tasks also clearly demonstrate situational models of possible daily life circumstances for foreign language communication.

The recent study analysis indicates that the most effective way of learning a foreign language is the method of complete immersion. This statement is relevant for acquiring trendy vocabulary and adequate syntax constructions, for pronunciation adjustment in compliance with geographical or social preconditions. Moreover, improving one's communication skills is one of the most wanted benefits of immersion into interaction with presumable partners because of resemblance of emotions and feelings got by native speakers when communicating with each other within their natural language environment. Nowadays, when English is learned as an end in itself course only by linguists, a long-term immersion into a foreign culture abroad means becoming unfocused for a professional to be. It suggests parting their time for evolving in a foreign language at the expense of other professional skill improvement.

In order to integrate foreign language learning into other spheres of a future professional's life different options have been introduced into vocational training: short-term language courses abroad, bilingual education, international projects on academic mobility. However, all mentioned above choices still demand considerable amount of time and advancement. The alternative ways of immersion can be implemented into foreign language training: audio and video-based problem situations, online courses and business games. The gamification needs meticulous preparation and perfect timing, which demand high-level qualification teachers. On the other hand, professionally oriented and business games are always welcome by students.

The following gamification features support advancing in foreign language training:

1. Gamification combines working out prearranged input data and legends with improvisation.
2. It is an active form of training – students are involved in the process all the time.
3. It stimulates developing an independent creative way of problem solving by participants.
4. It encourages group discussion and team work.
5. It reveals students' linguistic, professional and leadership potential.
6. It supports positive effect both as a routine learning aspect and as a final trial.
7. It increases student motivation and activity within the course.

The motivation aspect is a very important factor for using the game method and virtual reality technologies on a substantial scale in teaching languages, as motivation is one of the main driving forces in human behavior and independent activity.

As it applies to training engineers and computer specialists-to-be VR applications create necessary preconditions for motivation increasing [14; 15; 27]. Students of these specialities demonstrate initiative in presenting their professional background, creativeness, and cognitive independence. In respect of language learning, gamification through VR educational projects is a powerful learning tool. It meets the mentioned above terms of student voluntary involvement. Gamification also supports instructors in purposeful engaging their students into active, conscious cognitive activity [6].

Nowadays, one of the undeniable motivation factors with the students is innovative technology introduction, and namely augmented reality facilities [13; 17; 21; 22; 28].

3 VR tools for foreign language learning

The importance of using mobile devices and applications as education media tends to increase continuously [18; 19; 23; 24; 30]. Nevertheless, students themselves are not aware of the time amount and percentage of using namely online learning facilities. In order to estimate exact activities and to demonstrate students their involvement into online learning the survey has been conducted. In January 2019, students of Dmytro Motornyi Tavria State Agrotechnological University and Bogdan Khmelnitsky Melitopol State Pedagogical University, Melitopol, Ukraine (further referred to as university 1 and university 2 respectively) were invited to share their personal experience in using VR applications for learning foreign languages and to agree or disagree with four statements given below:

1. You use a smartphone not a cellphone.
2. You mostly access your university website from mobile devices than from desktop computers.
3. You are rather a mobile than a desktop user of the learning management system (Moodle).
4. You use more than three AR/VR applications for learning English.
5. Name AR/VR applications for learning foreign languages you use.

The first group of responders consisted of Computer Science undergraduate students (2-4 years) and postgraduate students at university 1. Curricula of these student groups include 20 credits and 4 credits of English and Business English respectively. Therefore, they have been used to regular media and e-learning implementation into English syllabi of every term. Online facilities for their foreign language communication competence development include wide range of resources within distant learning courses on the Moodle platform and numerous links and recommendations on the Foreign Languages Department website [8].

The second group of the survey participants included undergraduate and postgraduate students of university 2. They major in Computer Science either. At the pedagogical university curricula limit English as an academic discipline to 6 credits. The syllabi shift focus from direct in-class instruction to independent learning due to smaller amount of the study load.

The results of the survey are represented in the diagrams (Figures 1, 2, 3, 4).

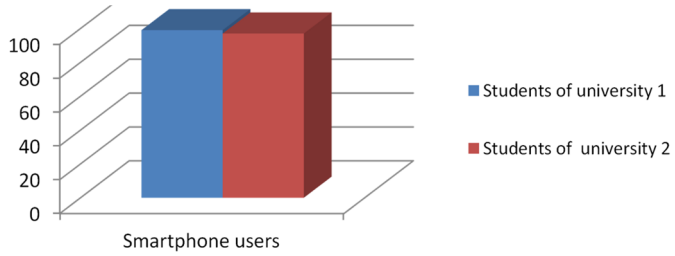

Fig. 1. The percentage of smartphone users at universities 1 and 2 (according to the survey).

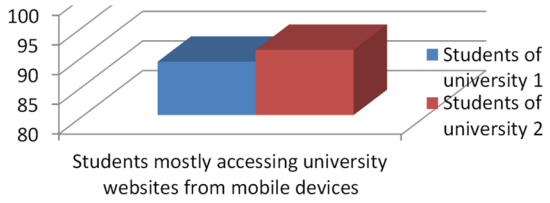

Fig. 2. The percentage of students accessing university websites from mobile devices at universities 1 and 2 (according to the survey).

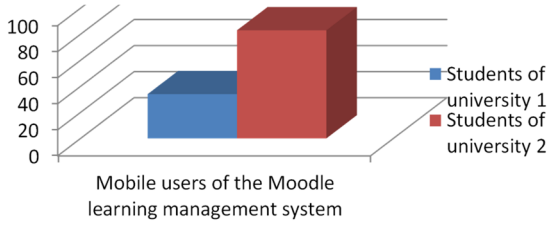

Fig. 3. The percentage of mobile users of the Moodle learning management system at universities 1 and 2 (according to the survey).

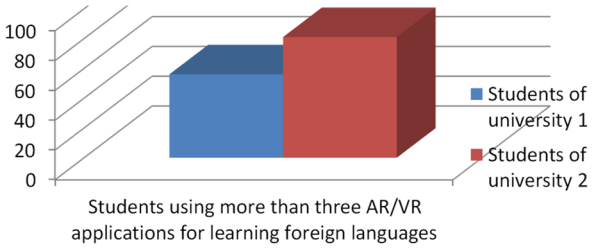

Fig. 4. The percentage of students using more than three AR/VR applications for foreign language learning at universities 1 and 2 (according to the survey).

Among 58 students of university 1 (99% of responders) use smartphones, 97% of 59 students of university 2 having participated in the survey have opted for smartphones either. The follow-up discussion has revealed that the benefits which are most frequently appealed to are the operating speed and online-application access.

The analysis of the answers to the second question has shown that the polled students mostly access university websites from their mobile devices. The students of university 1 (89%) appreciate both information amount and news urgency on the site and the website adjustment for mobile view. The responders from university 2 (91%) noted quick search option respond and numerous requisite external links added to the main page of their university website. Students from university 2 have also mentioned their attachment to the website of the Informatics and Cybernetics department within the university domain [11]. According to responders' own estimation they use it even more

willingly than the university 2 website due to both relevant content and visuals easily accessed and downloaded.

The third question has demonstrated significant differences in the percentage of mobile device usage for access to the learning management system and revealed the distinct patterns of operation while e-learning courses are created. Both universities place e-learning courses in Moodle using multiple evaluation options. Students of university 1 use mobile devices less often (34% vs. 83%) than responders from university 2. According to the responders' feedback, the difference is that at university 1 the matching question type in Moodle quizzes is chosen, which is not responsive to the mobile view. Most mentioned above matching tests are based on the drag-and-drop option, which functions only on desktop. Quizzes consisting of 10 pair matching drop-down box questions are rather widespread which requires switching from mobile to desktop view. At university 2 a conventional type of matching questions are common: the content area and a list of statements that students must match correctly are used.

Statement number four appeared to be controversial to responders. Most students (65%) at both universities have indicated quite a low VR application usage. The reasons are high prices for VR mobile headsets of high quality and purchasing access to simulated environments.

Nevertheless, students of both universities easily listed at least three VR applications for learning English. Responders from university 1 (56%) mostly named Mondly, VRSpeech and AltspaceVR. Students of university 2 (81%) mentioned on average five applications (Mondly, VRSpeech, VR Learn English, Gold Lotus and VirtualSpeech). The proficiency of students from university 2 in immersing themselves in a virtual English speaking world arises from their wider experience in regular using educational VR applications, as the pedagogical university has such a valuable asset as a VR laboratory. The laboratory is mostly used by the instructors of the Informatics and Cybernetics department to improve student professional skills. But since communication in English is one of the most demanded skills of modern specialists in the IT sphere, students themselves volunteer to subscribe and to test VR applications for learning English. Having formed their opinion about definite simulated environments as users and CS specialists they share their experience and either disapprove or recommend the tested app.

The subsequent discussion with students of both polled groups has revealed a lot of common features in student dual impression from testing VR and the thorough analysis conducted by the English teachers from the department of foreign languages. The most referred to by Internet users VR applications for English learning have been tested and analyzed both by instructors and students while using smartphones. The user friendliness, self-sufficiency and user's independence in application, advance and support of the apps were studied. The specifications of 6 popular virtual reality applications for foreign language learning are reproduced below.

VR Learn English [33] is the application for English vocabulary study. A user moving around the rooms can listen to the pronunciation of the names of the objects inside these rooms, learn and memorize them.

Gold Lotus [1] is similar to VR Learn English, but the places are more varied: shops, parks and famous cities. The learning materials include vocabulary and grammar.

Mondly [20] is the first application using augmented reality with the chatbot technology and speech recognition for studying foreign languages, engaging into conversation with users and giving feedback on their pronunciation. The application is aimed at studying thirty-three foreign languages. Mondly has similar features with the applications described above, but comprises reading, listening, writing and speaking activities. The distinguishing feature of the application is the possibility of taking part in the conversation with virtual characters on the given topic of real-life situations (making friends, ordering dinner, taking a taxi ride etc.).

VRSpeech [34] is the application for vocabulary acquisition and speaking training in two modes: the learning mode and the situation mode. All the situations a user is engaged are real-life ones: making orders in restaurants, job interviews, presentations etc. High quality speech-recognition and context-specific interaction are specific features of the application.

VirtualSpeech application [32] allows users to use different scenarios which are of crucial importance for forming key language skills. The components of VirtualSpeech scenarios are public speaking, promotions, networking, presentations and media training. Main peculiarities of the application are its realistic venues, such as virtual rooms with audience, presence of noise and distractions to fully immerse a user into the event. The function of speech analysis allows participants of the event to get feedback on their speeches, record all the speeches and have the progress results. The application can be used in the course of Business English for undergraduate and postgraduate students.

AltspaceVR [3] which is reasonable called as the place for events allows users to attend, participate in and organize numerous events like live shows, meetups, classes on different disciplines, presentations, performances, talk shows, and watch-parties.

The main features of the virtual reality applications for foreign language learning described above are given in Table 1.

Table 1. Main features of the virtual reality applications for foreign language learning

	Vocabulary acquisition	**Grammar learning**	**Speech recognition**	**Real-life situations**	**Speaking**
VR Learn English	+		+		
Gold Lotus	+	+	+		
Mondly	+	+	+	+	+
VRSpeech	+		+	+	+
VirtualSpeech	+		+	+	+
AltspaceVR	+		+	+	+

The poll and the testing have revealed that the least preferred VR application among the mentioned above is VR Learn English. Along with only two learning aspects the visual effects and the virtual environment are rather poor – it actually is a panoramic view of a place connected to the theme of the lesson, e.g. a clothes shop photo as a background with pop-up word definitions in white square boxes. The negative aspect is that the narrative text is of much more advanced level than the word explained and being processed. The pace of the narration is also inappropriate for the intended

vocabulary complexity level. Another challenging feature of VR Learn English is imperative of fixing a user's look on objects for several seconds in order to move on. Multiply repeated instructions to look left or right and to find the next object (as well as inevitable follow-up questions if a user has found the object) have been noted both by students and instructors as irritating.

The most appealing VR application for foreign language learning according to the table is Mondly designed by ATi Studios. The numerous benefits listed above are enlarged by user friendly technical support and customization.

The price policy includes regular reductions and lifetime access with one-time purchase at 95% off which is extremely inviting for Ukrainian students. The system requirements for smartphones are minimal, the Android app file size is 75 MB and updates are included. Every week a user is notified about a successive individually arranged lesson in their personal account. The virtual environment is colourful and vivid. The application characters are young adults and thus favourable for students, the conversational chatbot replies with a human voice. Although characters look cartoonish it cannot be estimated as a disadvantage because students appreciate the visuals. Moreover, the application is level graded in spite of the fact that designers intend the basic version for users 3 years old and over. Another positive aspect noted by instructors is motivation to self-reliant error correction, e.g. in the event of the user demonstrating incorrect word order within a dialogue a partner character politely asks to repeat the phrase to continue the conversation without indicating the sentence has been built wrong and without pointing out the mistake.

As the study shows, the most efficient methods, practices and techniques for learning foreign languages have been put in the basis of virtual reality applications and resources for foreign language studying methods: immersion, gamification, real-life situation simulation and others.

4 Conclusions

In conclusion it should be stated that VR is an inevitable tool in education of the nearest decades. It is going to be specifically demanded in under-graduate training, due to its attraction and motivation aspects for young adults who are proficient in information technology, relying on and being dependent on their smartphones. VR applications offer bright opportunities for both involvement students into foreign language learning process and achieving three main goals of this discipline successfully: enhancing foreign language learning, preparing under-graduates for real life and professional situations outside the native language environment, improving student communication skills.

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