

# Virtual Reality in Distance Education and Marketing Communications

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*Since its beginnings, virtual reality as an environment has attracted considerable attention of many a user and hence allowed for varied information in the domains of marketing, PR, education ... to be accessible. Due to its multidisciplinary character it appeared to be a continual inspiration for research, however an equally complex subject. It is for this reason that numerous examples of virtual reality implementation are encountered in medicine, education, manufacture, design, sales, at fairs and in entertainment activities...*

*The research titled "Practical Implementation of Virtual Reality in Marketing Communications and Distance Education" was conducted on the sample of students and employees engaged in information technologies and management. An example was presented that illustrates the implementation of virtual reality in distance education. The respondents were invited to express their attitudes via a number of items offered to them in a questionnaire. The obtained results were interpreted in the context of well known theoretical frameworks of marketing and distance learning.*

## 1. Introduction

### *Definition and the beginnings of distance education*

The American Council of Education defines the distance education system as an integral combination of technologies designed to support learning and training among individuals that are not physically present on the same location. Such systems generally insist on one technology, however, they draw on others too, in order to ensure the necessary flexibility.

The terms used in literature to describe distance learning range broadly: Distance Learning, Distance Training, Distance Education, eLearning, Electronic Classroom, Online Education, Virtual Instruction, Virtual Education, Virtual Classrooms, Blended Learning...

The beginnings of distance learning date back to the shorthand teacher, Isaac Pitman and the year 1840. He communicated with his students via the post, gave them assignments and received these assignments later to correct them. This method of work largely differed from the then prevailing traditional learning methods.

### *What does the term virtual mean?*

**Virtual** – the adjective used to describe an object, a service, or an activity that is situated or is performed in a cyber space, that is, on the Internet. The examples that include this adjective are numerous: Virtual Merchant, Virtual learning environment, Virtual School, Virtual university, Virtual Banking, Virtual Corporation, Virtual Fair, Virtual Press, Virtual Private Networks-VPN, Virtual Community, Virtual Society, VRML - Virtual Reality Markup Language, Pure virtual, Virtual device, Virtual Memory Manager, Virtual function, Virtual path, Virtual word...

**Virtual reality** allows for the simulation of various activities in an artificial environment.

A fascinating technology and its potentials attract the attention of scientists from different fields of study who want to implement a new methodology, technology in the context of their research, work, fields they are engaged in studying. On the other hand, restraints in presenting this method actually arise from the fact that it is impossible to know all the fields in which experiment have been conducted or this method has been implemented.

The authors Efraim Turban, Ephraim McLean, James Wetherbie structured the implementation of this technology in different fields of work in the following way

Industry	Application
Production	Training
	Design testing and interpretation of results
	Safety analysis
	Design of virtual prototypes
	Technical analysis
	Ergonomic analysis
	Virtual simulation of assembling, manufacture and maintenance
Architecture	Designing buildings and other structures
Business	Real estate presentation and valuation
	Advertizing
	Presentations in e-commerce
	Financial data presentation
Medicine	Surgeon training (on simulators)
	Medical data interpretation
	Planning surgical interventions
	Physiotherapy
Research and education	Virtual physics laboratories
	Gallaxy configurations
	Complex mathematics presentation
Entertainment	Virtual museums
	Three-dimensional games with racing cars (on personal computers)
	Simulations of air battles (on personal computers)
	Arcadian games in virtual reality
	Skiing simulator

**Table 1**

The same authors define virtual reality as **“Pseudo-3-D interactive technology which gives the user the feeling that he/she is physically present in a world created by the computer.”**<sup>1</sup>

***Which is the place of the example of virtual reality in the learning/distance learning context?***

Innovations in the technical/technological sense that are introduced into teaching require that their impact upon the change in the methodology of teaching be constantly analysed. New technologies are but a means to achieve the educational goal, not the achievement of the goal itself.

Attractive presentation, animation, multimedia materials, using teaching materials presented via the interactive board are only some of the reasons that teaching material should be reorganized in order that it should be made more interesting to the users.

The innovation themselves in the field of computer science and modern technologies used in teaching are not necessarily the cause of change in the methodolo-

gy of work, however, they are often assumed to be the motive to additionally adjust methodology for the purpose of achieving an even higher quality process.

Such change in methodology is achieved exclusively in the interaction with the subject contents, work objectives, the general concepts of work and the conditions of the schools, with the teacher and his/her role and finally with the student who has by all means to be viewed as a complete personality (in views of capabilities, character traits, motivation, interests, individual learning styles...).

The desire to make the teaching process flow comply to the active learning methods suggests that introducing new technologies should be perceived as one of the methods that would, in addition to learning that is largely practical, meaningful, supported by a large number of examples, creative and investigative, allow for achieving better results as regards educational goals and the development of the student as a personality.

***Virtual reality as means in the teaching process***

Generations of techniques have changed in search for achieving the best possible communication with didactic material users. The correspondence model, the multimedial model, the telecommunication model, up to the virtual model, all are considered to be the key changes in the model.

<sup>1</sup> Efraim Turban, Ephraim McLean, James Wetherbie, "Informaciona tehnologija za menadžment, Transformisanje poslovanja u digitalnu ekonomiju", Zavod za udžbenike i nastavna sredstva, Beograd, 2003.

On the other hand, too, some authors attempted to define the extent of “participation“, using computers in the learning process; it is in this aspect that Computer-Based Training (CBT), Computer Assisted Instruction (CAI), Video-Tele Training (VTT), Web-Based Training (WBT) and combined forms of education and training are discussed.

Computer-based and Web-based learning are assumed to be hierarchally highest from the standpoint of using various teaching aids (from verbal lecturing without any teaching aids, to using only the board and the chalk, the course book, audio-visual illustrations and aids...).

As a methodology/technology, virtual reality is assumed to belong to the fourth generation of techniques, i.e., to the Virtual model used for the purpose of distance learning.

In the context of learning mediation, virtual reality could also be viewed as the fourth offered model, i.e., as a Web-Based Training model (WBT), which does not exclude a possible hybrid model that could be a logical supplement to the above mentioned model.

#### ***Examples of virtual reality and their psychological-pedagogical classification.***

From the psychological aspect, the examples analysed in the research are based on learning following a model (learning by the example). Learning is mainly achieved by imitating and is based on observational conditioning. Observational learning can take place even without special rewarding or punishment related to it. The material offered to the Internet users is something they are expected to assimilate, incorporate. This process could not be realized completely if it did not lean on the learning by comprehension/cognition.

The principle based, theoretically defined forms of learning, are the modes of learning based on cognition (as regards the examples the respondents were to observe). The Internet, however, often offers the principle of support or reinforcement: correctly performed movements, correctly solved tests or problem situations on the Internet are reinforced by some sort of praise, applause, interesting music, sound, etc.

The subject matter taught (examples observed by the students) is learning motor skills.

In terms of Bloom’s taxonomy of educational objectives, it is interesting to see to what extent the learning of content matter aided by virtual reality can be used and which are the expectations as regards learning outputs. According to literature, Bloom lists three levels of learning outputs:

The cognitive level – comprehension, application, knowledge, analysis, synthesis, evaluation

The affective level – attitudes, values, interests, perception, intentions

The psychomotor level – skills, motion, notation, manipulation

The example analysed in this research belongs to the third, psychomotor level.

It is to be expected that virtual reality will be implemented and incorporated into the existing distance learning systems. It is for this reason that, in accordance with the characteristics of on-line education that means an easy access, a large number of experts, students, adaptability and personalization of curricula that this method is regarded as attractive for study both from the aspect of learning/distance learning and from the aspect of marketing services that inevitably accompany any type of communication on the Internet.

On the other hand, the followers of the traditional methods of education criticise this learning method pointing out the lack of the necessary direct contact with the teacher, the need for pre-knowledge, the fact that the appeal of the technology may overwhelm the subject matter it deals with, etc.

The dilemmas mentioned above and the pro- and counter-arguments are the reasons that the assessment of virtual reality as a method and its “use value“ as regards distance learning are addressed in a research manner. As the sample for the research mainly consists of students, this is another reason that those in everyday contact with different learning types clearly explain their attitudes towards this method.

## **1. Research subject**

The subject of this research is virtual reality as “environment/technology“ and its use value for learning and marketing communications.

## **2. Research goal**

A general goal is to explore the **possibilities of virtual reality application for the purpose of education.**

The first segment of the paper is the concrete research into the users’/students’ attitudes towards this method in order that the **advantages/disadvantages of this method and its prospective future be established.**

The second segment of the paper refers to **viewing virtual reality as a method** in the distance learning systems.

#### 4. Starting hypotheses of the research

The basic hypothesis assumes that in certain business segments virtual reality attracts a lot of attention by itself, since a majority of users wish to test it in different ways. Hence it is expected to be adopted by students to a satisfactory extent.

The research has a task to find the extent to which virtual reality as a new method is accepted among students, for the purpose of marketing communications and distance learning. As students are generally open to new challenges and experiments, on this occasion their interest in virtual reality as a method will be established as well as the individual assessment as to the field of work in which it could be implemented.

#### 5. Methods implemented in the research

A field research was conducted at the Faculty of Organizational Sciences, the Electrical Engineering and Computer Science College, the Belgrade Student Campus, as well as in the “Karaburma“ Student Hall. Data processing was performed in the SPSS.

Students were presented the material designed using virtual reality as a method/technology, as a good practice example. The example is of universal type (as regards its contents), hence it was not geared to the actual future profession of the students.

The Virtual Amusement Park (VPARK) Nice – Geneva is a material that was used in the work as basis for the presentation of the model of using VR in the distance learning context. It was designed in the “Virtual Reality Laboratory“ (VRlab), the former Computer Graphics laboratory (LIG) of the Swiss Federal Institute of Technology (EPFL) from Luisiana, formed by Prof. Daniel Thalman in July 1988. The laboratory is mainly engaged in modelling and three-dimensional animation within the Virtual world. VRLAB is a world leader laboratory in the real time. Virtual people are the key figures in the multimodal interaction section, in probing into the virtual environment, and in the increase of the reality degree.

The most important goal of the Virtual Amusement Park is the expansion of the existing VLNET virtual environment, shared systems, and creating material that integrates several applications based on the virtual environment distributed. The general framework of this project is to create key attraction and offer to the future users to incorporate their applications.

The material presents a person that performs a succession of physical movements that the user observes and

wishes to repeat. After a time the user himself starts practicing. During these exercises the user has the opportunity to compare the performance of his own movements with those of the person whose movements he wanted to learn. This is the opportunity for him to receive feedback information on his own achievement in learning.<sup>2</sup>

#### 6. The sample

The sample included a group of students from the Faculty of Organizational Sciences, the Electrical Engineering and Computer Science College and other students and employees in the IT and management domains who live and work in Belgrade. The FOS and EECS are familiar with information technologies and hence they are logically assumed to be interested in the virtual reality field.

The sample consisted of three groups: the group engaged in management studies, the group directly related to information technologies and the group of employees in the same fields of work. The reason for this classification was to identify a possible difference between:

- respondents who use information technologies as a means to achieve other knowledge or achieve marketing, commercial and other goals (hypothetical management students) and
- respondents that regard information technology and other methodologies such as virtual reality to be a specific technology product (which it actually is) and assess its use value regardless of the concrete subject matter it works with (hypothetical IT students).

The sample was largely uniform in terms of gender; the number of women respondents amounted to 51.3%.

The largest number of respondents belonged to the age group of 21-23 (39.17%), followed by the youngest students aged 18-20 (26.67%, and then the students aged 24-26 (20.83%), etc.

Since the majority of the sample is made up of the students, it is logical that at the moment their education level was IV (67.2%), followed by the participants with the education level VII (25.90%), those with level VI (6%) and those whose level of education was V (0.9%).

Of the respondents, 45.8% have work experience (formal or informal), while little more than a half (54.2%) still do not have any work experience.

<sup>2</sup> [http://vrlab.epfl.ch/Projects/projects\\_index.html](http://vrlab.epfl.ch/Projects/projects_index.html)  
[http://vrlab.epfl.ch/Movies/Movies\\_index.html](http://vrlab.epfl.ch/Movies/Movies_index.html)

The largest number of respondents had used the computer for 3-5 years (40.3%), while others had used it for 6-8 years (22.7%); then follow the respondents who had worked on the computer for the last two years (18.5%). There is a significant number, however, of those who had used the computer for 9-11 years (10.1%) and 12 and more years (8.4%).

The instructions for answering the questionnaire were given to all the respondents that took part in the research N-120.

### 7. Result analysis

The research was conducted in the November 2006 – May 2007 period at the Faculty of Organizational Sciences, the Electrical Engineering and Computer Science College in Belgrade, at the Belgrade “Student Campus“ and the “Karaburma“ Student Hall, as well as with the employees that deal with computers or management in a professional manner.

The research at the FOS and the EECSC was conducted in the conditions planned for the work with students. The overhead projector was used to present experimental examples to the students. The research in the Student Campus and the Student Hall at Karaburma was conducted in the area where the students get together during their breaks. The material containing the examples they were asked to comment were presented using the portable computer and could be viewed clearly, due to the fact that the research was conducted in small groups (3-6 respondents).

The ranking of the media when information on the education domain is collected is shown in the following table:

Meda	M
Internet – Web	2.11
TV	3.33
Specialized journals	4.02
Daily papers	4.03
Internet-mail	4.24
Weakly magazines	4.89
Radio	5.38

**Table 2**

\* Ranking was done on a 1-7 scale, where 1 is the first medium respondents choose.

Generally, 46.2% students assess the VR as a method of distance learning related subject matter presentation as effective; 10.1% rate it as very successful, and that

makes more than a half the number of respondents. There is a large number of indecisive, 33.6%, however, some maintain that this method is not successful (9.2%) or even very ineffective (0.8%).

Similarly to the previous assessment, this method of subject matter presentation in distance learning was attractive to 57.5% respondents, while 26.7% participants rate it as not attractive; the rest are ineffective (15.8%). The structure of respondents on the basis of the study field who were asked to assess the appeal of the subject matter can be seen in the following table.

P4 \* P20 Crosstabulation  
Count

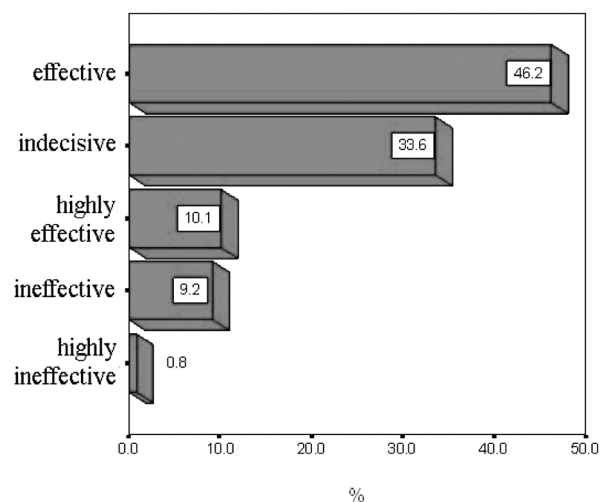
	appealing	indecisive	Not appealing	Total
Management	14	5	13	32
IT	23	7	10	40
Other	22	7	8	37
Total	59	19	31	109

**Table 3**

\* the “other“ group consists of the employees and the students of other departments at the faculty

It is absolutely predictable, in the population included in this survey, that the Web as one of the Internet services tops the list of media the respondents use to get informed on the education. Given the fact that the materials of educational institutions are well prepared and in a majority of cases are geared to the user needs, it is obvious that the present (or prospective) student find most information in this manner. The Web is followed by the TV, specialized journals, daily papers, etc.

### Assessment of Virtual Amusement Park presentation effectiveness



**Figure 1**

**Symetric Measures**

		Value
Nominal by Nominal	Contingency Coefficient	.175
N of Valid Cases		109

In view of the example presented, the IT students are more attracted to the subject matter designed using the VR in comparison with the management students. The contingency coefficient  $C=0.17$  indicates a low, but significant connection.

If the VR were implemented in terms of distance learning in the above presented manner, it would require that the learners have some knowledge of IT (67.5%) in the respondents' opinion; two out of ten think knowledge is not necessary (20.8%), whereas a small number are of opinion that it is either highly necessary (8.3%) or absolutely unnecessary (3.3%).

In the majority of respondents' opinions, this type of material presentation is innovative (71.7%), almost one quarter are indecisive (23.3%), while the smallest number think it is classical (5.0%).

The respondents generally assess the cost of the realization of this project as moderate (55.0%) or high (36.7%).

**The age of users that might be the target population for using the VR in the distance learning context**

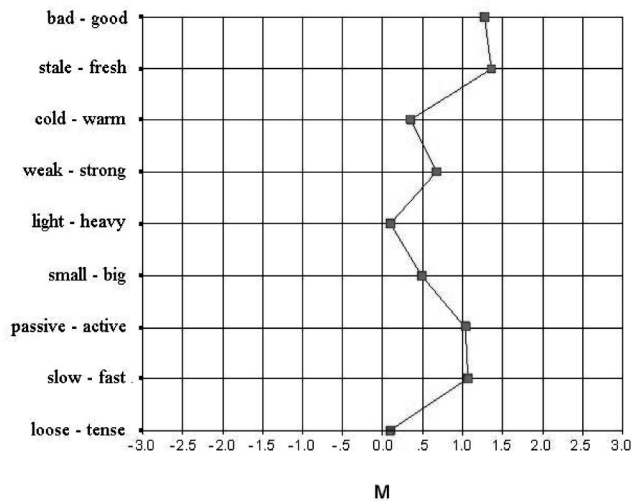
Age	f	%
19-29 year olds	109	37.20
30-39 year olds	78	26.62
do 18 year olds	75	25.60
40-49 year olds	25	8.53
50-59 year olds	3	1.02
60 and older	3	1.02
<b>Total</b>	<b>293</b>	<b>100.00</b>

**Table 4**

*\*Table is plotted on the basis of the number of responses received.*

On the basis of the data obtained a conclusion can be drawn that this type of material is meant primarily for young people in the period of studying (19-23 years old), then for people aged 30-39, and finally to the young people under the age of 18.

**Virtual Amusement Park Assessment on the Ozgude scale of semantic differential.**



**Figure 2**

The Virtual Amusement Park was assessed as good, fresh, active and fast, and largely strong and big.

The respondents were asked to assess the extent to which this method of material presentation complies to acquisition of certain knowledge and skills.

The respondents were asked to rate the extent to which (on a 1 – 5 scale) this type of material presentation is useful in acquiring new knowledge and skills.

The manner of presentation is adequate in teaching cognitive skills (mark 3.2) which include problem solving, planning and decision making, programming, report creating, data analysis, project planning, marketing strategy creation. It could also be an appropriate way of teaching psychomotor skills that include practical skills in terms of the interaction with machines, tools, transport vehicles (mark 3.1). The respondents estimate that such a type of presentation is least applicable, however still possible (mark 2.8) in behavioural skills that involve practical skills in interaction with people, suppliers, bosses, colleagues...

More than half a number of respondents would propose this method of presentation (VR aided) to their prospective client (54.2%) for the purpose distance learning. 36.7% respondents are indecisive, while 9.2% respondents would not recommend this method.

**7. Conclusion**

Prior to being given the items by which they were expected to express their attitudes towards the topic of virtual reality, the respondents were asked to answer a

number of general questions on their socio-demographic characteristics, but also about their habits in getting informed on education.

The results obtained reveal the fact that education is a field on which the respondents generally get informed through the Web, and then TV, specialized journals, daily papers, etc. This information shows that the opportunity of an easy access to the material, the availability of the material at the time suitable to the user, the dynamics, the flexibility, are the facts that already place the Web into the focus of the users' attention when they wish to get certain information and choose the educational institution that is to provide education service.

As regards the VR-presented example, the IT students showed a higher degree of interest in this type of material, which was proved by correlation. This is understandable given that it is new technologies that always capture their attention. Simultaneously, this fact proves that a possible designing of a VR-type material should first address the population that is employed in or studies IT (at least in the initial phase) and then those engaged in other fields of work.

#### ***Result analysis from the aspect of the components of the attitude towards virtual reality***

As regards the cognitive components of the attitude towards virtual reality, the respondents involved in the research have generally been using the computer for 3 – 5 years or from 5 -8 years which is a precondition enough to believe that they have mastered enough knowledge or understanding of the subject matter of this research.

The presentation itself of the Virtual Amusement Park is assessed as effective, and this kind of distance-learning related material presentation method is assessed by respondents as appealing (57.5%). It is these facts on the appeal level of the material that support our attitude that there is an emotional component to the attitude.

As regards the conative component of the attitude that would present the tendency to do something related to the object one has a defined attitude to, the fact that more than half the number of respondents (53.2%) would recommend to their prospective client the use of the VR only corroborates this attitude.

#### ***Analysis of research results form the aspect of marketing mix***

The product – The presentation of the Virtual Amusement Park was assessed as highly efficient, although a danger was recognized that “fascination“ with technology and its potentials can cast a shadow upon

the contents matter the technology/methodology deals with.

The cost – These are the projects executed by multidisciplinary teams and this is the reason that the issue of cost asked of the respondent to estimate was of importance for this reasearch. The respondents maintain that such projects imply that the cost will be moderate or high.

Location – The respondents are of opinion that this manner of presentation is appropriate for a fair presentation, for the Web, and for the product sales outlet itself.

Promotion – This type of promotion, according to the respondents, is useful in presenting certain distance learning materials.

People – The users of services presented through the VR, the respondents maintain, will most often be people 18-39 years old, with a seratin level of IT knowledge (no professional level of knowledge is necessary).

Service provision process – this means a lengthy preparation activities conducted by a multidisciplinary team. The virtual persons in this process demonstrate certain subject contents that the user learns or show advantages of using a given product.

Physical environment in which the service is delivered – The virtual environment where the user interacts with the marketing material presented or with the distance learning contents.

This means that the implementation of VR in the planning of the marketing mix instruments is a reality today, recognized by modern, future oriented companies. Thus the Match and the Nivea companies surprised their customers last year by a promotional campaign that made use of virtual reality to create perceptual sensations in customers. The characters from the campaign appeared at the computer desktops and simulated the use of the product. Upon the result evaluation the Nivea company significantly increased its market share in the last year and new forms of promotion raised the consumers' awareness of the Nivea company as modern and futuristic, keeping up with the time.

In their paper “Knowldege-based Economy, basis for growth and development“, published in the Management journal, the authors Jednak S. and D. Kragulj insist that economic development is a complex sociological process. In this paper, they also maintain that the developing countries can draw on the experiences of the developed knowledge-based economies. The traditional

determinant of work are work, capital, and technology. The goal of the EU countries is to develop knowledge and modern technology -based economy.<sup>3</sup>

In the paper "The New Paradigm of management – from innovation to competitive advantage", published in the Management journal, the author V. Malešević maintains that the 21st century requires a new approach to management, facing up the challenge, and implementation of innovation in business that lead to competitive advantage. The paper highlights the importance that companies be included into new information-communication flows, since this is the only way to keep up with modern business doing.<sup>4</sup>

Hence this paper highlights the opportunities for the modern technology implementation both in the field of education and in the field of business, as well as the importance of taking up the challenge by the management teams in the companies.

#### **Result analysis from the aspect of distance education**

This research brings up the issue of VR assessment in the distance learning domain to some extent. In this context, it is necessary to again highlight the fact that various cognitive processes are simulated via the computer – facilities maintenance, language understanding, problem solving. "The success and the failure in simulation have shown that our intuitions on what is cognitively complex and what is cognitively simple are often wrong. Playing chess may require extremely complex cognitive operations, however, the game can be formalized, hence today the computer can defeat any chess champion in the world. Contrary to this, the attempts to simulate object recognition, natural language understanding and fine motor coordination, i.e., the processes that are intuitively considered to be simple, faced serious difficulties that have not yet been resolved in a satisfactory manner."<sup>5</sup>

The respondents strongly believe that VR can help master cognitive skills such as problem solving, planning and decision making, report devising, data analysis, project planning, marketing strategies creating. They also believe that psychomotor skills such as interaction with machines, tools, transport vehicles, can be mastered in this manner.

<sup>3</sup>Jednak S. i Kragulj D. "Ekonomija zasnovana na znanju, osnova za rast i razvoj", *Menadžment, časopisa za teoriju i praksu menadžmenta*, Vol.15/57, pp. 5-13; 2010.

<sup>4</sup>Malešević V., "Nova paradigma menadžmenta-od inovacija do kompetitivne prednosti", *Menadžment, časopisa za teoriju i praksu menadžmenta*, Vol.15/57, pp. 55-63; 2010.

<sup>5</sup>Aleksandar Kostić, "Kognitivna psihologija", *Zavod za udžbenike i nastavna sredstva Beograd*, pp. 39; 2006.

At least, they believe that it is possible to master behavioral skills that include interaction with clients, suppliers, colleagues, and employees. They are, however, not so much convinced that this is the best way to simulate the processes that mean some aspect of direct communication.

Regardless of the fact that the respondents had some belief in the VR as a method to be implemented in distance learning, it is necessary that the next step should include its experimental verification, in addition to the respondents' generally positive attitudes.

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