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VIRTUAL REALITY

A study of Generation Z's involvement in virtual reality

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Background. This study analyzes the characteristics of modern teenagers' involvement in virtual reality (VR). It also examines various approaches to VR in Russian science. In the current study the concept of virtual reality is defined as a particular informational environment in which a person can exist and develop. It is created by a special class of technical systems, formed on the basis of computer hypertext technology, and has a number of social and psychological characteristics. We pay special attention to the significance of virtual space for generation Z (according to the William Strauss and Neil Howe generational theory). The main factor determining the unique psychological features of the generation Z is its active involvement in virtual reality from the moment of birth. Involvement in a virtual reality is measurable by a teenager's activity on the Internet.

Objective. Our study set out to determine the level of Russian generation Z's involvement in virtual reality.

Design. We analyzed the results of a survey conducted among Moscow adolescents using multivariate profiles. Two hundred fifty-four teenagers 12-14 years old were interviewed during the study.

Results and conclusion. Analysis of the data revealed the following: Modern teenagers are involved in VR with varying degrees of depth; their main type of activity on the Internet is searching for educational information and news; and no significant differences by gender in the purposes of using the Internet were found. However, it was also determined that girls' activity in VR is more related to communication and interpersonal interaction, even though it's indirect via the Internet, while boys prefer the "gaming" possibilities of VR; that teenagers are rather critical of the information they obtain by the Internet, and that their level of trust in the online information is low. The same trend is evident in the fact that students prefer not to make new friends in virtual reality.

Keywords: virtual reality (VR), generation Z, involvement, Internet, socialization

Introduction

The Internet is an integral part of the world of modern man. According to the Public Opinion Foundation survey conducted in May of 2015, 49% of the Russian adult population (57.1 million) go online daily (*Interest in online news*, 2015). According to research conducted in the Stavropol region in 2014, only 6.3% of students (14-18 years old) are not interested in computers. (*Social Portrait of the youth of the Stavropol region*, 2015). At the same time, Internet users note the following negative aspects: the presence of unnecessary, harmful information (23%), formation of Internet addiction (19%), the negative impact on children (access to harmful information, limitation of direct communication, etc.) (12%), and replacement of direct contact with people by the Internet (6%) (*About the benefits and dangers of the Internet and the peculiarities of its use*, 2014). The high degree of popular involvement, and, above all, the involvement of adolescents, with the Internet determines the relevance of this study and its objective: to reveal the peculiarities of the involvement of adolescents (representatives of generation Z) in a virtual reality.

In our study, a virtual reality is referred to as a particular informational environment in which a person can exist and develop, and which is created by a special class of technical systems, formed on the basis of computer hypertext technology. A virtual reality has a number of social and psychological characteristics: the ability to simulate activity by one or more users; disembodied and ontologically uncertain identity; anonymity (hiding one's real status); deliberate impersonality; identity expansion; the ability to have many different virtual personalities, etc. Today, VR may mean using the Internet, as well as the hardware for entering into a virtual reality (Omni, OculusRift), or creating an augmented reality (Google Glass, etc.). The technical means for creating a virtual reality are represented currently by computers, game consoles, smartphones, tablets, and programs for training, developing and entertainment.

The very concept of virtuality appeared in the history of culture quite a long time ago. In 1966 I. Sutherland invented a virtual reality helmet (*Display windowing by clipping*, 1972), and in 1989 programmer G. Lanier introduced the concept of "virtual reality" (Braslavsky, 2003).

Thus, the term's first meaning comes from its traditional use in the technical field: "The term "virtual reality" refers to a special class of technical systems for information display." (Velichkovsky, 2001).

The second approach to understanding virtual reality can be found in the work on virtualistics by N.A. Nosov (2017) and others. In this approach, the term "is used in those contexts for which J. Piaget used the term "symbolic function," and A.R. Luria used the expression "linguistic reality" and spoke of "a doubling of reality" (Kuznetsova & Chudova, 2008). In this sense, according to Y.M. Kuznetsova and N.V. Chudova, the whole psychology of cognition is the psychology of "virtual reality" (Kuznetsova & Chudova, 2008, pp. 6-7).

We may find the development of this idea in the works of A.E. Voiskunskiy and M.Ja. Menshikov, who wrote: "Virtual reality, created by the visualization of three-dimensional objects by means of computer graphics, animation, and programming, is a product not only of informational, but also psychological technologies" (Voiskunskiy & Menshikov, 2008).

The research carried out by V.V. Selivanov and his colleagues is based on the following characteristics of VR: 1) the creation of three-dimensional images of objects as close as possible to the models of real objects by means of computer programming; 2) the possibility of animating them; 3) network data processing carried out in real time; and 4) the creation of the presence effect by means of computer programming (Selivanov & Selivanova, 2014).

Currently we can say that VR has become a part of our everyday life, is quite commonplace, and penetrates more and more into various areas of our lives. From the psycho-pedagogical viewpoint, an active intrusion of virtual reality (VR) into our lives has an ambiguous character. On the one hand, it has made possible the development and transformation of human activity by the emergence of new skills, operations, procedures and types of actions, new activities, new target and motivational-semantic structures, and new forms of mediation (Pleshakov, 2011). In particular, VR is used in pedagogy as a special information space where the student can get specific information, as well as make contacts and carry out some elements of scientific training and project activities. Experiments by P.A. Pobokin have shown that virtual training programs have a positive, stimulating effect on the cognitive aspect of a student's mind, and on the personal and subjective aspects of intellectual search (Pobokin, 2015).

On the other hand, VR addiction can develop and gradually worsen, and as a result, a person could begin to prefer the virtual world, believing it would be the most appropriate for him. Such an addiction appears in the process of cyber-socialization (virtual computer socialization) for reasons specifically related to an individual's dissatisfaction with his or her actual reality (personal, economic, social, cultural, etc.). As negative consequences of this process we may also specify technological stresses, computer phobia, cyber-addiction, hacking, narrowing of range of interests, uncommunicativeness and social withdrawal, and qualitative transformation of the mental processes (Krasnoyarova, 2010).

The large-scale involvement in VR by the adult population will inevitably lead to its prevalence among the younger generation, and especially among teenagers. Modern teenagers (12-17 years old), according to the generational theory of William Strauss and Neil Howe, belong to the so-called digital generation or "Generation Z" (Strauss & Howe, 1991). They have been familiar with digital technology and virtual space since early childhood, and then become active Internet users. "Literally born with the iPad in their hands," the researchers wrote in their report on Generation Z, "Generation Focus Group Report," prepared for the 3M company (Novitskiy & Vinogradova 2016).

That report was a generalized psychological portrait of Generation Z, which resulted in the following findings. Gen Zers really care about the preservation of their health and safety, carefully read instructions, and follow them. Gen Z adheres to the principle "living in the present," prefers to spend time having fun, and tries not to worry too much about anything. The main purpose of their lives is "to be happy." How does Gen Z understand happiness? They associate it with physical and psychological comfort, personal freedom, and the possibility of seeing the world. Gen Z would like to spend life travelling and having fun (with friends or family). They work to earn their living. This is a generation of consumers.

The biggest myth, the report said, is that Gen Z has a good understanding of advanced technologies. In fact, its members are far from knowing the simplest laws of mechanics, chemistry, and physics. Gen Z has the ability to perform an incredibly large number of tasks simultaneously. Gen Zers have no loyalty to their employers or organizations they work for. It will be much more difficult for them than for previous generations to endure pain, suffering, and deprivation. Most of them have never experienced hunger or homelessness (Konyukhov, 2016; Vinogradova, 2016; Novitskiy, 2016).

Many researchers consider active involvement in VR as the main factor determining the psychological characteristics of Gen Z. By involvement in virtual reality, the authors mean the activity focused on interaction with the objects from the virtual environment in the form of communication and activities of varying degrees of intensity. Thus, the authors of the present study set the objective of determining the degree of involvement of Russian Generation Z in virtual reality. To achieve this goal we identified the following problems to be solved:

First: to determine the degree of Generation Z's involvement in VR.

Second: to identify the range of adolescents' activity in VR.

Third: to prove the existence of gender differences in Generation Z's activity in VR.

Fourth: to identify the personal attitude of a teenager to VR.

Method

To accomplish the above-mentioned objectives, we conducted a survey of teenagers in 2015. Our questionnaire included 14 questions, 10 of which were "closed," i.e. multiple choice. The questions were divided into the following blocks:

1. Socio-demographic characteristics of the respondent;
2. Types of activity in VR (e.g., "What are you doing on the Internet?" (14 options were available);
3. Time spent in VR (e.g., "How often do you use the Internet?" (five options were offered);
4. The personal attitude of the teenager toward VR (e.g., "Do you think online communication helps you to understand yourself and the world better?", "How much do you trust the information on the Internet?".

The answer to the first problem ("To determine the involvement degree of Generation Z in VR") was provided by the third block of questions. The answer to the second problem ("To identify the range of activity of adolescents in the VR") was provided by the second and the fourth blocks of questions. The third research problem ("To prove the existence of gender differences in generation Z activity in VR") was solved using the non-parametric Mann-Whitney test. The answer to the fourth problem ("To identify a teenager's attitude to VR") was provided by the answers to the questions of the fourth block.

A representative sample was chosen by random selection (randomization) of students from three Moscow schools. At the start of the survey, we questioned 254 adolescents 12–14 years old at the schools. After initial processing of the completed

questionnaires and exclusion of "spoiled" ones (not completely filled), 204 questionnaires were accepted for further analysis. The sample included 107 boys and 97 girls (Glazkov, Ermolaev, Puchkova, & Sukhovershina, 2015).

In order to identify the teenagers' specific activity in VR, we applied Spearman's correlation analysis between the questions "How often do you use the Internet?"; "Do you use the Internet: at home; at school, in public transport?"; and "What do you prefer to do in your spare time?" (significance level $p \leq 0.05$). Answers to the question "What do you do on the Internet?" were subjected to *Friedman's* two-way *analysis* of variance by *ranks* (significance level $p \leq 0.05$). To find gender differences, all the answers were analyzed using the non-parametric Mann-Whitney test (significance level $p \leq 0.05$).

The integral level of involvement in the virtual environment was determined by statistical analysis of the average score. In order to minimize possible social desirability bias in the responses, we relied on two procedures: 1) the voluntary participation of adolescents in the study; and 2) confidentiality of the results.

Results and discussion

Let us hereby proceed to the results obtained through the answers to the first research problem: "To determine the degree of Generation Z's involvement in VR."

Statistical analysis of the answers to the question "How often do you use the Internet?" revealed the following. Nearly thirty-five percent (34.8%) of the teenagers said that they go online "several times a day"; 22.1% "once or twice a day"; 22.5% "almost always online"; 12.7% "several times a week," and 7.8% "once a week or less." Thus, all the respondents were involved in VR, although with varying degrees of intensity. More than 75% of the teenagers were involved to an average or high degree.

Let us compare the data we obtained with the results of the study "Teens and the Internet" conducted by FOM in 2008 (*Teenagers and the Internet*, 2008). That study showed that 24.5% of adolescents didn't use the Internet. Three-quarters of them explained that fact by pointing to obstacles beyond their control ("I don't have a computer or Internet access," "I can't afford it," or "I have no possibility to use it (at school too)"). Only about a third of them explained it with subjective reasons ("I don't know," "I don't want to", "I'm not interested"). Thus, over the last seven years, the number of teenagers who don't use the Internet has decreased by about a third.

In 2008, 18% of Moscow teenagers spent at least 6 hours a day on the Internet on weekdays, while 26% did the same on weekends.

In exploring how much young people spend their spare time in VR ("What do you prefer to do in your free time"), we found that 20.69% of the teenager respondents chose the Internet more than 5 times out of 27 possible options, 26.6% chose it 3-4 times, and 36.95% of respondents chose VR once or twice, while others (15.76%) didn't choose VR at all. In other words, most of the students do not spent their free time only in virtual reality.

The Spearman analysis of the correlation coefficient between the teenagers' preferences in "spending their free time" and the rest of surveyed characteristics showed that the more spare time a teenager spends on VR, the more often he does it in an accessible location–i.e. at home, at school, on public transport–and com-

bines it with other activities (doing something else and using the Internet at the same time). A teenager uses instant message applications, makes or receives calls over the Internet, makes posts (or comments) in social networks, visits entertainment websites, views content connected with his hobbies and interests, and plays online games while watching TV, eating, doing domestic duties, etc.

We then analyzed the types of Internet activities which teenagers prefer (we used Friedman's two-way analysis of variance by ranks). Our ranking of the answers to the question "What are you doing on the Internet?" is presented in *Table 1*.

Table 1. Ranking of the responses to the question "What are you doing on the Internet?"

Response options	Mean / Rank	Significance (in descending order)
Looking for information and news	9.33	1
Using instant messaging (Skype, Viber, ICQ, Whatsapp, private messages, etc.)	9.29	2
Browsing content related to hobbies, interests	8.06	3
Spending time at entertainment websites	7.58	4-5
Reading your friends' newsfeed	7.58	4-5
Playing online game	7.43	6
Making or receiving calls over the Internet (Skype, etc.)	7.05	7
Checking e-mail	6.88	8
Making posts (messages) in social networks	6.57	9
Posting your photos, pictures, recipes, and other results of creative activity on the Internet	6.11	10
Commenting on blogs / posts / photos of other people	6.10	11
Posting your comments on discussion forums / platforms	5.18	12
Posting in your blog or microblog (Twitter)	3.83	13

Let us proceed to the analysis of the answers to the second and third research problems ("To identify the range of adolescents' activity in the VR", and "To prove the existence of gender differences in generation Z activity in VR") by comparing them with the data of the 2008 study (*Teenagers and the Internet*, 2008).

In 2008, the teens' most common activities on the Internet as per the monthly Internet survey were searching (71%), downloading and listening to music (67%), downloading all sorts of programs (55%), using email (49%), downloading and watching movies and videos (43%), instant messaging (38%), online games (38%), and communication on blogs, forums, and social networks (36%) (*Teenagers and the Internet*, 2008).

According to our study results, we can say that teenagers now primarily use the Internet to search for information and read the news (first place among all preferences), and, taking into account the data of the comparative analysis (non-parametric Mann-Whitney test), the answers of boys and girls on this scale showed

no significant difference. This suggests that teenagers generally prefer this type of mass media to get news and other information.

The answer "using instant messaging (Skype, Viber, ICQ, Whatsapp, private messages, etc.)" occupies the second place by preference (with a minimal difference from the first) for the respondents. As noted earlier, girls chose this option of using the Internet significantly more often than boys.

The third most important factor in teenagers' involvement in VR is the possibility "to view content related to hobbies, interests." The answers to this question don't differ for boys and girls. The answers sharing fourth and fifth place in the "activities on the Internet" rating, are "spending time at entertainment websites (difference in the responses of boys and girls is not found)," and "reading your friends' newsfeed." As noted earlier, girls are more likely than boys to spend their time on the Internet on interpersonal interactions. Despite the fact that online games occupy seventh place in the overall rating, boys are significantly more likely than girls to spend their time on this activity.

Among other types of the ranked Internet activities, "posting your photos, pictures, recipes, and other results of creative activity on the Internet" and "commenting on blogs/posts/ photos of other people" are more common for girls.

Comparative analysis of the survey results by gender shows that the average score on the scale of "total involvement in a virtual environment" does not show any significant differences. That means that boys and girls are using the Internet in the same way.

However, significant differences (by Mann-Whitney criterion) were detected during the processing of the statistical results. To the question "What are you doing on the Internet?" girls often chose the following answers: "using instant messaging (Skype, Viber, ICQ, Whatsapp, private messages, etc."; "posting your photos, pictures, recipes, and other results of creative activity on the Internet"; "reading your friends' newsfeed"; and "commenting on blogs/posts/ photos of other people". To the question "Do you use the Internet in the learning process?" girls more often than boys answered: "Yes, for exchange of studies-related information with classmates." Boys were significantly more likely than girls to choose the answer "playing online games" to the question "What are you doing on the Internet?". And on the question "In your spare time you prefer ..." boys were more likely to choose the answer "to be in the virtual space."

Thus, the purpose of using the Internet has changed over the last seven years: previously it was downloading all sorts of programs and music, and today it is searching for information and instant messaging (Skype, Viber, ICQ, Whatsapp, private messages, etc.). Previously entertainment purposes were dominant, and today the purposes are informational and communicative. Girls are more likely to use the virtual environment for the purposes of communication, interaction, and exchange of information with their friends, while boys prefer to spend their free time on the Internet playing online games.

The solution to the fourth problem posed by the study ("To identify teens' private attitudes toward VR") is presented below.

A statistical analysis of the responses to the question "How much do you trust the information on the Internet?" shows that the majority of respondents (34.8%) answered this question with "I trust about half the information," while the second

most popular answer was "I trust most of the information." (31.37%). Only 4.41% of respondents fully trusted information obtained from the Internet, and the rest of them chose "Trust a small piece of information," or "I do not trust it completely" (23.04% and 4.4%, respectively). These results lead to the assumption that teenagers are quite critical and do not believe all the information that they find on the Internet.

It was found that 11-14 year old adolescents prefer not to find new friends on the Internet (shown by answers to the question "Did you make new friends on the Internet?"): up to 30.4% of respondents have "never" made new friends in the virtual reality, or do it very "rarely." About 20% of the students make new friends "sometimes." Sixteen percent (16%) of the respondents use the Internet for finding new friends "often" and "always."

The assumption that the avoidance of making new friends virtually may be connected with a low level of trust in the information on the Internet is not confirmed, due to the absence of a significant correlation between the scales. Maybe teenagers are satisfied with their present "friend list," and their "friend list" consists of "real" people with whom the students interact outside VR (friends from school, sport clubs, recreational facilities, etc.).

Analysis of the responses to the question "Do you think that online communication helps you to understand yourself and the world better?" showed that almost half of respondents (47.5%) think that Internet communication sometimes helps them "to understand themselves and the world," and sometimes doesn't. Eighteen percent (18%) of teenagers were still inclined to believe that it is possible to understand themselves and the world through online interaction "mostly" or "completely," but nearly 35% have the opposite opinion.

Responses to the question "Whose opinion of yourself do you consider more important?" included the option "Internet friends." The respondents were also asked to rank the level of the opinion's importance. The results showed that more than 40% of the teenagers have ranked Internet friends' opinions about themselves as having a low level of significance (40.2%), a slight level (6.9%), or even of no significance at all (17.6%). However, for 6% of the respondents, the opinion of Internet friends was quite significant, and for 24% of adolescents, their Internet friends' opinion was very important. Perhaps in answering this question, the students had in mind the number of "likes" (signs of attention and approval) under the posted information, photos and comments, which express approval, support of the posted information, and feedback.

The ranking of the responses to the question "Do you use the Internet in the learning process?" revealed that the students put "searching for information" in first place. This response was correlated with the response to the question "What are you doing on the Internet?": "looking for information and news." Thus, the predominance of the student's cognitive motivation determined the direction of his/her Internet activity.

The students put the answer about the exchange of studies-related information with the classmate in second place. This is also an important factor in the interaction of modern teenagers. It is possible to post a message in a network community created by teenagers; and although feedback may be delayed, a student will receive it once he goes online. Using special functions, a teacher (or a classmate, or a class

monitor, for example) can even track whether the information was read by the student. To a lesser extent, the students use resources of the Internet for taking online courses and getting feedback from the teacher.

We also analyzed the "Integral level of involvement" into the virtual activity throughout the entire questionnaire. Thus, in general, more than a half of the students (119 people of 204 respondents, or 58.33%) showed an average level of involvement, and 56 respondents (28%) showed a weak or low level of involvement. "High" and "higher than usual" levels of involvement were found among 27 people (13%).

Conclusion

Summing up the results of the study, we can state that:

1. Modern adolescents use VR with varying degrees of involvement;
2. The main type of teenage activity on the Internet is searching for educational information and news;
3. There are no significant differences by gender in the purposes of using the Internet. However, it was determined that girls' activity in the VR is more related with communication and interpersonal interaction, even though it's indirect via the Internet, while boys prefer the "gaming" possibilities of VR;
4. Adolescents are rather critical of the information obtained from the Internet, as evidenced by their low level of trust in the information obtained online. The same trend is confirmed by the fact that students prefer not to make new friends virtually; and
5. The main type of teenage activity on the Internet is searching for information for educational purposes and searching for the news (rather than online games, as it is commonly believed).

Limitations

The data that was used and analyzed in this study is limited to a selection of Moscow students. And although the results of our study match the results of other studies, we find it necessary to continue the research in small towns and rural areas, as well as to make a comparative analysis of the same issues with Generation Y.

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