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Physical and Augmented Reality As Elements of Visual Culture: Proportions in Educational Products for Persons with ASD

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Abstract

This article raises the question of the impossibility of standardised use of augmented reality technologies in the educational process. This approach changes the status of augmented reality and transforms it into a phenomenon of visual culture. The authors represent a hypothetical ratio of physical and augmented realities in educational products for people with autism spectrum disorders (ASD), considering their needs, behavioural patterns and states. The proportion is based on the authors' advanced research.

Keywords: augmented reality, visual culture, education, educational product, needs, autism spectrum disorders.

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1. Introduction

Including the elements of augmented reality (hereafter referred to as "AR") in education of people with autism spectrum disorders (hereafter referred to as "ASD") is a relevant and feasible objective. It is relevant, because it is common for people with ASD to experience difficulties in social interaction and a number of psychophysical, emotional and mental problems, which have been amply described by different researchers [6; 7]. It is feasible because AR technologies are rapidly developing and special needs of different people can be taken into account as long as project aims are relevant. [2; 3; 4]. Within the frameworks of inclusive education in Russia creating robust educational products for people with ASD should become a clear-cut goal. Inclusive education breaks away from the previous mindset where people with disabilities were driven to the fringe of society and were mostly perceived as a social group which begs and depends on 'normal' people. This group demonstrated some differences both in behaviour and disposition, which clearly put them at a disadvantage. Inclusive education can also make

the difference in the interaction between people in case the environment (as well as visual environment) is thoroughly prepared.

2. Methodology

2.1. Key methodological dilemma

The complexity of work with people with ASD lies in the fact that manifestations can vary from one person to another. Affective problems, difficulties in developing active relationships within the dynamically changing environment, setting their mind on environmental stability and children's behavioural stereotypes are common. Although the very existence of autism rejects the common stereotype of typical solutions and algorithms we are accustomed to and which are still dominating not solely secondary education.

3. Discussion and Results

In the space of culture-based discourse, we consider augmented reality to be not only a set of technologies, but a factor of substantial change of visual environment and visual culture in general. The analysis of educational products using augmented reality, which are available on the Web, shows that the vision and evaluation of the AR social and cultural scale by technical experts is incomplete. They do not take into account the semantics of prints, colours and objects, select images and stylistics randomly and do not consider the ratio of physical and augmented realities.

In particular, developers cannot tell the difference between the aesthetics of primary games and educational games, despite their significant functional difference. This fact is understandable, considering the relative youth of the technology, but it is challenging for culture studies and humanities professionals to assess the social and cultural prerequisites and consequences of AR use.

Our primary concern is special and inclusive education of children with ASD. It is generally considered in pseudo-professional circles that "the more AR, the better". This peremptory opinion is alarming because when it comes to socialisation, it cannot be reduced to the mere immersion in an environment with augmented reality. Tactile sensations, auditory contact, particular communication skills training are also necessary. In addition, some authors suggest that virtual reality triggers, or at least exacerbates autism [5].

Having studied the article about immersion and presence effects [1] and compiled data on most frequent problems of people with ASD [2; 6], we suggested that the ratio of physical and augmented realities in educational products should be different while addressing various problems.

TABLE 1: Estimated proportion of physical and augmented realities in the educational product for people with ASD.

Need or problem of a child with ASD	AR formats to meet the need	Not recommended techniques and formats	Relevant design tools	Hypothetical ratio of physical and augmented realities, ensuring the effect of immersion
Communicative problems	Introduction to AR a mediating character for communication with other people; gamififcation of communication; demonstration of communication	Textual recommendations on communication, prescriptions	Certain style of the character's rendering, their mimics, face, color solution, the degree of image simplification	50-50
A trend for repetitive movements	Clarity of the script; strengthening of the recurrent elements in the script through the use of recognisable visual signs	Illustration of some actions with dynamic images, which perform repetitive motions – it is exhausting both visually and mentally	Using ornaments, frames, recurring patterns at different scales	90-10
Attention span problems	Appearance of pop-ups with visual and auditory reminders	Bright highlighting of relevant information – it is annoying and exhausting both visually and mentally	Clear fonts which are easy to read, short friendly commands	80-20
Fine motor skills impairment	Inclusion of small buttons in the most interesting games or exercises	Instructions for a variety of movements	Demonstration of the result efforts with motor skills engagement	90-10
Emotional vulnerability	Backgrounds and other colour solutions with positive impact	«Bubbles», bright arrows and other comic books' techniques	Combinations of colours that can provide the right emotional support	80-20
The need for correct behavioural models	Inclusion of models in the games' scripts that connect physical and augmented reality; social stories	Instructions on correct behavioral models	Speed of animation that represents the models	50-50

4. Conclusion

In doing so, culture-based approach helps to: a) retain the right of every participant of the educational process to have customised set of virtual reality elements (as opposed to the typical one, which is unproductive and pointless); b) take into account its elements as cultural phenomena and shapes at different scales and of different nature: for example, colours perceived from a cultural perspective; probable image symbolism (deliberate or accidental); the culture of font scripts; compositional traditions etc.; c) setting an objective to form virtual environment that would be best adapted for an individual or for interacting with people, for example, in the model of inclusive education (Table 1).

A similar table can help to coordinate the aggregation of empirical data or conduct pilot studies on perception and the effects of augmented reality on the people with autism spectrum disorders. Conversely, such studies contribute to harmonisation of the modern culture environment, which is acquiring a more inclusive nature.

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