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Inclusive Society – Reality and Virtual Reality

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After clarifying the concept of inclusivity, the chapter lists the factors that need to be borne in mind by a society that treats people with disabilities as equal citizens. Possible means to achieve this goal are properly applied virtual reality methods. The chapter highlights some of the methods that can be applied to people with autism, learning disabilities, cerebral palsy, and wheelchairs, and to help these people with disabilities live as independent life as possible for them. The tools of virtual reality can also play an important role in sensitizing and shaping attitudes in an inclusive society. The third part of the chapter focuses on these possibilities.

Keywords: incusive society, virtual reality, disabilities, autism, cerebral palsy, wheelchair.

What does an Inclusive Society mean?

What happens if a wheelchair user wants to roll into a school? In a desired case, several people jump up, open the door, and help him or her. What happens when we enter a school and see everyone sitting in a wheelchair while we do not? Acting normally means doing something that is done by many, or at least often. If we belong to a minority, we feel uncomfortable, even when surrounded by people with helpful intentions. We do not feel equal to others. We do not feel as we were "normal". This feeling also appears when surrounded by people with helpful intentions. How can the missing balance be created?

The concept of inclusiveness is most aptly formulated as follows: 'We define inclusivity as the practice of including people across differences, and we assert that inclusivity implies an intentional practice of recognizing and working to mitigate biases that lead to marginalisation or exclusion of some people' (Dewsbury & Brame, 2019). Inclusive education means that 'teaching involves being responsive to the diversity represented in the classroom and assisting learners to focus on their culture, attitudes, and beliefs while learning to communicate and collaborate with each other and their patients' (Billings, 2008).

Viewing the word 'inclusive' as a type of acronym may provide better insight into the meaning of the word. As such, every letter can correspond to the following elements:

I = Independent
N = Non-judgemental
C = Closeness
L = Limitation-free
U = Understanding
S = Safety
I = Import
V = Valuableness
E = Early

I = Independent. The final aim in educating people living with disabilities is to aid them in being as independent as possible. In this context, independence not only means that people with disabilities can manage with as little help as possible, but also that they do not suffer discrimination from those in their environment. Independent people are able to represent their interests, stand up for their rights, and help one another in this effort. Society's responsibility is crucial in accepting that people with disabilities are the best experts in their own lives, as they experience their situation from within, something the rest of society can only view from outside.

N = Non-judgmental. Being non-judgmental means non-judging or criticising other people whether they live with disabilities or not. It may come as a surprise, but withholding criticism is not only the task of the host society, but also that of people with disabilities, their relatives, and caregivers. 'I see them staring at my son on the bus. I would love to slap all the onlookers', was a statement made by the parent of a boy with Down syndrome when she described how she experiences other people's reactions regarding her son. (Kollár, 2013). Being non-judgmental is to be open-minded: this also means being open to the events and phenomena of the world. Being non-judgmental is being tolerant, to accept the opinions of others, even if they do not agree with ours. Being non-judgmental is being receptive to fresh ideas and different forms of behaviour.

C = Closeness. One of the symptoms of discrediting people is emphasising different opinions, not maintaining eye-contact, and remaining distant from them. If we take a closer look at a group of people we know less, we can gain knowledge about them that can fundamentally change the way we think about them. I like to take my medical students to institutions where they can make contact with people with disabilities as a kind of 'field exercise'. In my experience, each visit radically changes their attitudes toward people with disabilities. Even my foreign students are able to memorise some Hungarian words that help them to communicate with people living with disabilities. Even a handshake can make wonders.

L = Limitation-free. This applies not only to physical limitations, but also to the limitations inherent in thinking. It is very important that there should be no obstacles impeding the free movement of people with wheelchairs. It is

also important that travel agents include them in their travels so that they can open the world to them. At the same time, it is at least as important that the 'benches and bumps' inherent to thinking about the environment should not become barriers to the acceptance of people with disabilities.

U = Understanding. Where understanding cannot find a medium, imitation of understanding often appears. Understanding and cognition goes hand-in-hand. Without cognition, comprehension is difficult to imagine. It takes openness and courage to get to know one another. There is a need for society not to be afraid to get to know people who, because of their different physical and / or intellectual abilities, do not look like the majority. Fear, the root of prejudice, often lies in the fact that we cannot include people who are less like us in our ideas of a perfect world. If obstacles are removed from the path of cognition, understanding also becomes much easier.

S = Safety. When two groups are averse to one another, mutual acceptance and the expression of this acceptance are essential for both to feel safe. This revelation can take the form of words, such as laws designed to protect the rights of people with disabilities. More importantly, it can take the form of deeds. Laws provide the legal basis for actions, but do not replace them. The security of an inclusive and accepting environment is fundamentally created by actions.

I = Import. An inclusive society is always open to the constructive initiatives it experiences in other countries and societies. This openness makes it possible to localise, import, and adapt these experiences to the home environment. This process, of course, requires mutual openness, the exchange of experiences, organisation of joint conferences, study tours, and exchanges between host societies.

V = Valuableness. It is very important that the achieved results and extant shortcomings be regularly assessed, as the criteria and tasks of moving to the next level of social inclusion can be established in light of this knowledge. It is very important that both results and shortcomings be measured in concrete numbers and steps: only by this means can we ensure the objective valuableness of progress, i.e., the demonstration that one has succeeded in moving from a certain level to the next.

E = Education. The role of education is essential to ensuring social inclusion. Of course, an entire society cannot be sent back to school for the purpose of educating them, but the principle of 'If you want to teach me, reach me' can be used to find the channels through which certain sections of society are susceptible. Thus, books, films, film series, games, songs, scientific publications, etc. provide the means for reaching different people, thereby enabling the idea of inclusion and mutual acceptance to become a natural medium for society.

Using Virtual Reality to Promote an Inclusive Society

Is it possible to create, even temporarily, a world in which people with and without disabilities can feel equal? Answering this question comprises the purpose of virtual reality, a tool that allows us to create an environment within which everyone can feel equal and thus achieve the state of democracy to which every human being is entitled.

Depending on the extent to which it helps the user immerse themselves in the experience, three types of virtual reality can be distinguished: non-immersive, semi-immersive, and immersive types. Non-immersive VR applications include, for example, Nintendo Wii, a tool originally developed for gaming purposes that was quickly found to have uses for rehabilitation as well. While a semi-immersive application (for example using large scale projectors together with computer graphics) can provide a realistic experience, the user can also look around to make sure that the image is only a representation of reality. Fully immersive application provides the most realistic experience and is usually achieved with high resolution VR goggles. The realistic perception can be further enhanced with the help of VR gloves, which also provide a tactile experience for the user.

In short, virtual reality can open a door to a world that its user is unable to enter on his or her own due to a kind of (material, physical, intellectual, etc.) barrier. In this paper I would like to provide a small insight into some of the application possibilities that can provide the user with the experience of being equal to others. I would like to guide the reader to areas where both people with disabilities and people without disabilities are able to form a community together by accepting and feeling comfortable about each other. Attaining this mutual space can only be accomplished when direct help and the process of attitude forming occur. The following examples will further reveal how virtual reality technology can aid the achievement of inclusivity.

Helping People Living with Disabilities

Autistic Children in Schools

Teaching children with autism poses special challenges for teachers. Attention must be paid to teaching the necessary curriculum, to children having different interests, and to eliminating possible disturbances caused by unexpected stimuli. Creating this special balance is not an easy task. It is necessary to find VR software that kids love, is not overly challenging for them visually and physically, is sufficiently exciting, contains reassuring elements, and, of course, develops children's learning skills. This challenge is further complicated by the fact that autism manifests itself as a spectrum disorder, meaning that we no longer speak of 'autism' but instead refer to this phenomenon as 'autism spectrum disorder (ASD)'. Since this condition is actually a communication disorder, children with ASD tend to have difficulty expressing themselves, are unable to focus on one thing for extended periods of time, are awkward in their social relationships, and have difficulty expressing their feelings (Manju

et al., 2018; Orm, 2020). However, given that it is a spectrum disorder, it is very difficult to find a universal educational method that is appropriate for all children with ASD. The cognitive abilities of children with ASD also differ significantly. Individual education plays a significant role in this situation.

Creating an appropriate software is a great challenge since the creation and animation of (to mention one example) realistic-looking and natural-behaving humanoids to simulate students and professor activity in a classroom environment. A similar issue lies in providing proper facial expressions and lipsync abilities for the purpose of conveying emotion and speech in real time based on user interaction during the experimental scenario. Despite the obvious difficulties, accomplishing these aims is nevertheless possible. A group of researchers used a type of software for developing children with ASD that included common scenes such as entering a classroom, choosing a seat, and participating in group work (El-Shehaly et al., 2013).

Newbutt et al. (Newbutt et al., 2020) studied children with ASD focusing on the following areas of immersive VR use: developing social skills; preparing for things that scare the children in the real world; going to places that present uncertainties in real life; meeting people/making friends; relaxation; doing things independently; developing learning opportunities for school in virtual reality; and going to places virtually to see what the world looks like. According to their results, the most frequent answer given by children with ASD was that 'It [VR technology] relaxes me and I feel calm'. This opinion highlights one of the general benefits of using VR technology in children with ASD. In other words, with virtual reality, educators may be able to create a soothing environment for children in a short period of time, where they will be able to deal with events that may be too stressful for them.

The opportunities in applying virtual reality techniques also affect many other areas. Due to individual differences in development, an important feature is choosing developmentally suitable treatment goals. Virtual reality may provide tools for this: considering the need for tailored intervention in order to achieve individualised treatment goals, a wide range of environments and exercises can easily be realised in a virtual environment. VR therefore possesses an advantage in providing the ability to adjust interventions concurrent with the achievement of teaching goals. Virtual reality enables child-initiated teaching episodes and environmental arrangement that goes beyond the possibilities of real-life situations. When the child can choose the preferred training episode, this decision additionally provides motivation for learning. Teachers can create an environment that motivates a child to conduct a teaching process that is considered to be relevant or helpful.

A virtual environment can be arranged in several ways with the ability to simulate environments and situations that are usually impractical or inaccessible in traditional teaching. The environmental arrangement in virtual reality may also be advantageous; for example, it is possible to present less stressful social environments that are safer than traffic situations, for instance. By means of positive reinforcement, children can learn new social skills in a virtual environment while the child's visual experiences can be monitored on a laptop,

tablet, or smartphone. Such technology can also be used for modelling situations to simulate more complex events compared to what is feasible in real life. Thus, the attentional focus of the child can be broadened (Dechsling et al., 2021).

In an experiment involving 120 children with ASD (Zhao et. al., 2020) cognitive training was applied by using virtual reality methods. The researchers focused not only on cognitive training but also verbal social, computational, large muscle, and physical coordination training of children with ASD. As a result, it turned out that the training improved social communication, speech quality, the range of interests, and rigid behaviour. VR emerged as an effective tool for intervention in the health field.

As was previously mentioned, the aim of helping people living with disabilities is helping them to be as independent as they can be. Portuguese scientists (Bernardes et. al., 2015) developed a virtual reality program for children with ASD in order to prepare them for bus travel. The software could display a three-dimensional city and set tasks involving taking buses to reach specific destinations. Participants had to validate tickets, not sit in priority seats, and had to press the stop button by a certain timely pressed the stop button. At the beginning of the game, the player had the opportunity to choose the task and its difficulty, thereby allowing for progression as tasks were completed. A tutorial was also included since different participants may need different time to become used to the game. During the tutorial, participants were asked to read the current objective aloud. This type of a project could help people living with ASD to live more independently while applying the advantageous effects of gamification.

People with Learning Disabilities

Teaching people with learning disabilities is a special challenge as this type of student requires specific training programs while both the student and their teachers need extra motivation for participating in this challenging task. In an experiment using virtual reality (Standen et al., 2000) participants with learning disabilities spent twelve sessions learning to use desktop virtual environments designed to teach independent living skills. They had to practice in four different environments. In a virtual supermarket they had to create an icon-based shopping list, select items from the shelves, find all the items from the shopping list and pay for goods at the checkout. In a virtual café the tasks included making choices and decisions, ordering drinks from a list for oneself and others, practicing social skills when ordering, communication with staff and public, money handling (paying for drinks), appropriate behaviour (table manners, etiquette), choosing appropriate dress, toilet use in public situation, and dealing with alcohol (what drinks can be ordered at what ages and the effects of these drinks). In a virtual transportation environment, participants had to select the correct coins for the bus, leave the house with enough time to catch the bus, cross the road safely, catch the correct bus, pay the bus driver, collect their ticket, and get off at the correct stop. Finally, in a virtual factory the tasks comprised selecting correct clothing before entering the factory,

learning the dangers of crossing black and yellow lines, understanding the storage methods of chemicals, fire safety drills, the importance of COSSH (the law that requires employers to control substances that are hazardous to health), and hygiene within the factory. According to the results, these tasks maintained the attention and motivation of participants while the positive feedback they acquired improved their willingness to learn.

Virtual reality can also be used for controlling memory impairment (Optale et al., 2010). The researchers implemented a virtual realty training intervention to try to lessen cognitive decline and improve memory functions by involving elderly individuals with memory deficit in six months of training that involved auditory stimulation and virtual reality experiences in path finding. These elderly individuals participated in social, creative, and assisted-mobility activities. The researchers found that participants who received the treatment displayed improvement in general cognitive functioning and verbal memory. The largest effects were observed in long-term memory, a result that is in keeping with the cognitive abilities stimulated by the auditory session.

People with Cerebral Palsy

Cerebral palsy is one of the three most common lifelong developmental disabilities. Motor disorders in people with CP are often accompanied by disturbances in perception, cognition, and communication, as well as other behavioural issues. Epilepsy and secondary musculoskeletal difficulties are also common. The importance of early recognition and rehabilitation is very important. Non-immersive virtual reality methods like Nintendo-Wii have already been proven useful in this field. By using this tool, both gross motor function and the participants' internal motivation regarding the exercises could be improved (Gordon et al., 2012).

In another experiment using immersive virtual reality (Gagliardi et al., 2018), sixteen school-aged children with bilateral cerebral palsy diplegia who were attending mainstream schools were recruited for a pilot study in a pre-post treatment experimental design. The virtual reality rehabilitation system was designed for the development of interactive and immersive virtual reality applications within which the subject was a central part of a real-time feedback loop. This VR system integrated a treadmill on a motion frame, a motion-capture system, and a 180° cylindrical projection screen. The participants underwent eighteen immersive virtual reality therapy sessions throughout a four-week period. Walking patterns, speed, endurance, gross motor abilities, and most kinematic and kinetic parameters significantly improved after the intervention.

People in wheelchairs

One of the essential uses of virtual reality is to provide safe conditions for carrying out dangerous activities. One such activity comprises using a wheelchair given that collisions due to a lack of experience can result in severe injuries. Virtual reality can also be used for providing a risk-free environment for improving

driving skills (Harrison et al., 2002; Headleand et al., 2016). A review (Arlati et al., 2020) gathering scientific literature aiming at the effectiveness of applying virtual reality for training wheelchair users collected 62 articles describing 29 wheelchair simulators. It was proven that incorporating an observer into a virtual environment is an effective method for training and that virtual experiences are transferable to the real world (Alshaer, et al., 2020).

Sensitisation, attitude formation

It is very important that people who have not received training in working with people with disabilities should have access to knowledge and experience in this area as well. Experiments aimed at this field appeared decades earlier, when it was possible to try out different types of wheelchairs and special glasses imitating individual visual impairments were created to demonstrate what it is like to live as a visually impaired person. Making such tools popular is particularly important in the field of education, as teachers and their fellow students can meet peers with disabilities on a day-to-day basis. With the advent of virtual reality, the repository of tools for sensitisation has been expanded.

How VR can be used to aid wheelchair user was previously discussed; another question remains regarding how wheelchair usage can be made livable for people living without disabilities. Of course, the easiest way would be for the individual to sit into a wheelchair, but this opportunity is not always available. Virtual reality can help in this kind of sensitising exercise as well. It has been proven by investigations (Chowdhury et al., 2019) that disability simulation affects information recall and participants' implicit association towards people with disabilities. The researchers hypothesised that a disability simulation with a tracked head mounted display and a wheelchair interface would have a significantly larger effect on participants' information recall and their implicit association towards people living with disabilities compared to a desktop monitor and gamepad. Their study results show that the participants in an immersive head mounted display condition performed better in an information recall task compared to those in the non-immersive desktop condition. Moreover, a tracked head mounted display and a wheelchair interface garnered significantly larger effects in participants' implicit association towards people living with disabilities than a desktop monitor and a gamepad. In an additional experiment, US researchers (Chowdhury, Shahnewaz Ferdous & Quarles, 2019) recruited 71 unpaid students displaying normal or corrected-to-normal vision for an experiment wherein participants had to navigate real wheelchairs in a virtual environment. Virtual reality could provide the experience of 'being there' and thus raised awareness towards people living with disabilities and promoted empathy.

By using virtual reality tools, the aim of another study (Kollár, 2020) was to change the attitudes of medical students towards elderly people with dementia in a positive way and raise awareness toward the importance of studying dementia in the elderly. Medical students who had studied old-age dementia only in textbooks are generally removed from elderly, demented patients. Usually, the

students do not understand the feelings or reactions of such patients and view communicating with older adults as time-consuming and challenging. Their initial impulse is to cut such conversations as short as possible. Nevertheless, the attitude of students who have had a personal relationship with this particular group of elderly individuals usually feel closer to the subject, and their attitudes toward dementia in old age are quite different. Virtual reality can help bridge the gap between future doctors and their patients. In a five-minute virtual reality experience, students had the opportunity to live 'in' the circumstance of an elderly people living with dementia while hearing the patient's thoughts and acting as if they were the patients. This short experience was significantly able to change students' attitudes toward patients with dementia in a positive way. Some opinions students wrote after the virtual reality experience can be read in the following:

'The VR experience gave me a shock… Through VR I could feel how it really is for the elderly to fight against dementia.'

'I thought I have to be kind to my grandfather and grandmother. It was really interesting study and I really appreciate this chance.'

'The VR application I used were usually interactive and immersive in your own perspective but being immersed in someone else's perspective, especially with a condition like dementia, really does help in understanding and empathising with the patient. I look forward to seeing further development in these tools for both doctors and the families of patients.'

'I became completely touched while using it. It would be important for many of my colleagues to try it for their future doctor-patient relationship as well. But not only medical students, everyone should be more involved, it would even make life easier for family members.'

Summary

In an inclusive society, it is both important to help those in need and develop accepting attitudes towards them. To do this, it is worthwhile to use modern methods that are both attention-grabbing and effective. Rehabilitation methods based on virtual reality have proven to be such, as this technique can directly help people with disabilities while additionally influencing the attitudes of people living without disabilities towards their fellow human beings. In this paper, I have primarily focused on VR's possibilities, as opposed to its limitations. Of course, using virtual reality method is only recommended for those who welcome it, do not experience dizziness or headaches, and do not find that it disturbs their image of the world. Since VR may exert a strong influence on users, care must be taken to prevent addiction. In my examination, I have only mentioned a few of the available options. Several other topics could have been explored, such as that of applying virtual reality to experience

concerts, exhibitions, music learning, world travel, etc., as doing so would open doors to worlds that the user may not be able to reach due to physical or other limitations. My aim was to draw attention to an opportunity that is worth dealing with wisely, but which certainly has a place in the 'toolbox' used for building an inclusive society.

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