



An Investigation into Using VR for Improving Public Speaking

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Abstract

This article is a literature review on how virtual reality (VR) can assist individuals in enhancing their public speaking skills and overcoming fear. This paper combines the theories of cognitive behavioral therapy, mindfulness therapy, and non-verbal communication. It summarizes and analyzes previous research and theories, investigates the application of VR to help overcome the fear of public speaking, and identifies controversial claims and research gaps. This work aims to assist individuals in conquering their fear of public speaking and enhancing their public speaking abilities through VR technology, ultimately resulting in improved career advancement and overall happiness. The project will attempt to do the following: (1) Investigate how traditional cognitive behavioural therapy and VR cognitive behavioural therapy can help people with fear of speech; (2) Investigate how mindfulness meditation and breathing training in mindfulness therapy help speech fear and the advantages of mindfulness meditation in VR; (3) Investigate the non-verbal communication in speech and the training of sight and gesture in a speech by VR technology. Google Scholar and University of Leeds Library are used as the main sources for retrieving articles. The publication dates of the articles are mainly between 2017 and 2023. The keywords used to search for articles are as follows: “public speaking” or “cognitive behavioural therapy”, “virtual reality” or “cognitive behavioural therapy”, “public speaking” or “mindfulness therapy”, “virtual reality” or “mindfulness therapy”, “public speaking” or “nonverbal communication skills training”, “virtual reality” or “nonverbal communication skills training”.

Keywords

Public speaking, Virtual Reality, Cognitive behavioural therapy, Mindfulness therapy, Non-verbal communication

1. Introduction

Public speaking anxiety is a kind of social anxiety disorder that affects people's wellness, such as income, education, and career development. According to statistics, as many as 80% of people have experienced communication fear in specific situations, and 70% are about public speaking situations [1]. However, few people who are afraid of speaking seek treatment. This aspect is worth exploring. This paper will investigate and analyze the role of VR technology in helping to improve public speaking from the perspectives of cognitive behavioural therapy, mindfulness therapy, and nonverbal communication skills training. This article will discover the controversial claims of VR technology to help public speaking topics, the limitations of technology and industry gaps, and discover more possibilities for VR technology to help people overcome situational fear and improve their wellness.

2. Fear of public speaking and cognitive behavioural therapy

2.1 Cognitive Behavioral Therapy

Speech rehearsals and constant exposure to public speaking scenarios are the most popular methods for dealing with public speaking anxiety. However, most people with speech anxiety avoid public speaking or rehearse inefficiently, such as over-preparing speeches and rehearsing silently, so other methods are needed to help. Heimberg et al. found that cognitive behavioural group therapy is an effective means besides drug therapy [2]. It involves exposure therapy and cognitive restructuring. There are lots of traditional exposure therapy-led cognitive behavioural therapy, such as the therapist guiding the patient to muscle relaxation and imagining anxiety-inducing scenarios so that the relaxed state overcomes the anxiety [3]. Another approach is group therapy, which means that group members help patients simulate certain social situations, but group members need to be trained, and the situation is often uncontrollable [4].

Cognitive modification therapy mainly includes Motley's communication-orientation modification therapy and visualization of cognitive modification techniques [5]. The former aims to persuade people who fear public speaking to shift from performance orientation to communication orientation. Cognitive correction technique visualization involves guiding students to develop their visual scripts after relaxation or watching videos of successful presentations and imagining themselves as that speaker. There are some limitations to modification therapy. For example, lots of studies have suggested that communication-orientation modification therapy may not be appropriate for all cultures. Visualizations of cognitive modification techniques require the patient's imagination ability. Nowadays, the emergence of VR therapy provides a new opportunity for cognitive behavioural therapy. Compared with traditional methods, VR-based cognitive behavioural therapy is more controllable and scenario-personalized, saving the training cost of convening group members.

2.2 The application of cognitive behavioural therapy combined with VR

Most research has been on exposure therapy in areas where VR technology and cognitive behavioural therapy have helped improve speech. Lefebvre et al. expanded imaginative interaction in VR therapy by having participants enter a 360-degree classroom video and give a speech [6]. The function of rehearsal in VR video plays a role in desensitizing participants to public speaking in general. However, it still has a limitation in that the audience cannot respond to what the speaker says. Chollet et al. further studied three kinds of interactive virtual audiences with non-interactive, direct visual feedback, and non-verbal feedback under machine learning training to train participants and give feedback on participants' listening behaviours before and after the training [7]. Virtual speech allows users to simulate speech in different scenarios, such as eye contact training and vocal exercises, and provide feedback on the user's speech performance [8]. A study by Trinh et al. differs from other exposure methods to an audience by using life-size virtual agents for joint presentations in front of an audience [9].

There are also limitations to using virtual reality and cognitive behavioural therapy to help improve speech. There are few studies on cognitive reorganization using VR technology to help improve speech. It deserves further research. Kimani and Bickmore designed a 3D avatar virtual agent cognitive behavioural therapy consultant that helps users with cognitive reconstruction [10]. However, the visual field resolution of HMDS in virtual reality technology is still limited. There is also much debate about the effect of the size of the virtual audience on the speaker. We still need further research on the effect of the number of virtual audience members in VR technology on the speaker and whether the change in the size of the actual audience has the same effect, which can help in graded exposure treatment of speech fear.

3. Fear of speech and mindfulness therapy

3.1 Mindfulness therapy

Unlike cognitive behaviour in behavioural cognitive therapy, which corrects errors, mindful awareness arises from paying purposeful attention to things in the present moment. Mindfulness therapy can treat psychological problems such as eating disorders, anxiety, and depression. Kumar explored the mediating role of self-esteem between mindfulness and social anxiety and proved that people with low self-esteem can reduce anxiety in public speaking by learning mindfulness [11]. Mindfulness meditation has many advantages. However, there are still many people who believe that meditation is ineffective. For example, in Kaplan-Rakowski et al.'s study on meditation and exam stress,

40% of students still believe that meditation does not help them get good grades [12]. In the future, we should further explore the effectiveness of meditation duration on anxiety and what other mediating factors besides self-esteem affect mindfulness and anxiety relief.

Respiratory therapy, the oldest and most straightforward method of stress management, which reduces anxiety levels, is a meditation that focuses on the mind and respiratory organs to regulate breathing. Kimani et al. explored breathing interventions to use in front of the audience [13]. He asked the participants to wear a chest strap breathing sensor for demonstration. Among the three prototypes, the best effect was Breath-Prompt-Monitor: the breathing prompt popped up, and the slide continued to play after the system detected the presenter's deep breathing. However, the study was also somewhat controversial, and participants may have felt judged by the breathing prompts, which had the exact opposite effect. Dincer et al. studied breathing exercises in non-speaking time [14]. They concluded through controlled trials that breathing therapy helps reduce anxiety during public speaking.

3.2 VR technology and mindfulness therapy

The emergence of VR technology can promote mindfulness therapy. Kaplan-Rakowski et al. verified that virtual reality meditation is more effective than video meditation [12]. It lets users see natural scenes in the home environment, creating an immersive feeling, increasing immersion, and inhibiting external stimuli. Users have a high acceptance of practising mindfulness with VR technology [15]. Calm Place is a joint project between VR therapy developer Mimerse and Sweden's second-largest hospital to help people reduce stress and anxiety. We need to investigate VR and meditation more. Calm Place visualizes peaceful environments with forests/lakes, beaches, and mountains for meditators, allowing users to adjust the time, weather, and viewing location. Happy Place is a similar product developed by Mimerse. They believe that a Low Poly art style can increase the sense of presence more than the real environment, making the images more colourful and vibrant. Happy Place interacts with the eye by changing where the user is looking from black and white to colour or triggering animations, encouraging slow, controlled breathing through the movement of surrounding trees and flashing lights. However, many users reflect that they do not know how to interact and do not like low poly scenes. Patibanda et al. designed a virtual reality game called The Tree of Life, in which players can control the tree's growth by practising lip shrinkage [16]. It cleverly combines gamification with breathing exercises and introduces the concept of "body play," using people's control over their bodies as a resource for game design.

4. Public speaking and non-verbal communication

4.1 Non-verbal communication

The communication method developed by Albert Mehrabian shows the importance of non-verbal signals in communication: "55% of effective communication is through body language and only 7% through spoken language" [17]. Body language includes facial expressions, gestures, movements, and voices. The most important facial feature people use when communicating is their eyes, and listeners are likelier to trust speakers who are more attentive to the audience. For a speaker, allocating sight in time and space, such as establishing a connection with the audience by staring at other people's eyes and faces, is a crucial expressive skill. Using gestures in speech can enhance the audience's attention and thus strengthen the argument. It can also make the wording precise and avoid complicated terms the audience needs help understanding. Goldin-Meadow further studied the role of gestures from the perspective of reducing the cognitive load of speakers, and the use of gestures also occurs in the communication between congenitally blind speakers and blind listeners [18]. Gestures appear to occur in cortical areas different from those that process verbal material, and the process of switching from verbal expression to gesture helps the speaker to free up cognitive resources for use elsewhere [19]. Therefore, gestures not only reflect the cognitive state of the speaker but may also help the speaker process information or improve memory. Gestures are crucial to both the speaker and the audience.

4.2 Non-verbal communication training in VR

VR helps speakers make eye contact with the audience. Synthetic image tools can display the content of a head-mounted display on a computer, allowing the viewer to enter the speaker's perspective physically. LeFebvre et al. explore how synthetic mirroring tools can help speech learners manage time, look at the audience, and take notes

based on the speaker's specific areas of interest in a virtual environment [20]. It can use audio and visual cues to remind the speaker to look at the audience during the simulation. Video recording is an effective teaching tool for public speaking. It can help speakers review their own verbal and non-verbal elements and learn from experience through reflection. However, people with public speaking anxiety are often reluctant to watch videos of themselves due to a lack of confidence. Zhou et al. explored a reflection system based on VR technology to help speakers reflect on their non-verbal communication. In the presentation mode, which simulates an actual speech scene, the system records the speech and movements of the speaker [21]. It creates the continuous movements of a 3D avatar similar to the speaker's height, after which the speaker can enter playback mode to watch and reflect on his or her speech from the audience's perspective. There are still some questions about the effect of VR technology on nonverbal behaviour training. In the absence of relevant data and experience on the influence of a speaker's sight on presentation, speech teaching is often self-evident [22]. In the study by Zhou et al., loss of facial expressions and gesture-tracking errors also appeared. In addition to reflecting on the performance of their eyes and gestures, we should also train on the speaker's weaknesses [21]. The observation period in the experiment is short, and we should also observe whether VR technology substantially affects the improvement of speech ability in the long run.

5. Conclusion

This literature review aims to bring together various approaches to treating fear of speech and speech training. It explores how virtual reality technology can help speakers overcome their fear of speaking and improve their speaking skills. The investigation found that VR immersion, inhibition of external stimuli, controllability, multi-sensory, and other characteristics of speech fear and other mental health problems. However, shortcomings include insufficient attention to VR therapy, different therapeutic effects caused by cultural differences, and limited visual field resolution of HMD. Psychotherapy is a severe topic. VR is only an auxiliary means of treatment, and nowadays, various treatment programs still need more effectiveness and exploration of therapeutic accidents and more precise evidence. It can not substitute for therapy. Many cases in which VR is used to treat speech fear and speech training have introduced gamification mechanisms, which provide flexible and fun ways to treat and train. In addition to presentations, VR therapy, and training can be used in situations such as job interviews and team management. It is valuable for improving people's wellness and deserves further exploration.

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