DOI: https://doi.org/10.3217/978-3-85125-657-4-12

Job Interview Training in Virtual Reality: Evaluation in Laboratory Settings

Mikhail Fominykh [0000-0001-9958-4816] and Ekaterina Prasolova-Førland [0000-0001-5109-9395]

IMTEL, Norwegian University of Science and Technology, Trondheim, Norway
mikhail.fominykh@ntnu.no, ekaterip@ntnu.no

Abstract. This paper presents a concept, a prototype design and evaluation results of a virtual reality application for job interview training. We used rapid prototyping to develop several industry-specific applications that provided a rich presentation of occupations, targeting a specific group of young job seekers, including high-school students and unemployed. Each application included a job interview training component, developed using 360-degrees videos and simple scenario branching techniques. In addition, considering the results of intermediary evaluations, we developed a generic industry-independent job interview training application with a realistic scenario. The prototypes were evaluated by several groups of primary users and experts. The data were collected using questionnaires and interviews. The results indicate a generally positive attitude towards the concept job-interview training, both as part of industry-specific applications and as a stand-alone exercise. In the paper, we discuss the potential of job interview training in virtual reality for career guidance and fighting youth unemployment and various practical and technology considerations.

Keywords: Virtual Reality, Job interview training, 360-degrees videos.

1 Introduction

For many young job seekers today (young unemployed and high-school students), technology is a natural part of life, while traditional career guidance services and their channels of communication 'lag behind' digitally. They often rely on text-only presentation modes and basic training methods, so young people feel uncertain about the path they should choose. Entering work life can be frustrating and stressful, going through choosing a profession, searching for vacancies and attending job interviews. Therefore, there is a need to explore new and more efficient ways to communicate with and train young job seekers, as well as to facilitate engaging and safe working experiences. Virtual reality (VR) can provide an alternative, engaging and cost-effective and supplement to traditional career guidance. In this paper, we report results of a study exploring this relatively new application area of immersive technologies.

We report evaluation results of applying 360-degrees videos (hereafter called 360-videos) for job interview training. These results are a part of a larger study, where we introduced a concept of 'Immersive Job Taste' – capturing experiences in the workplace (e.g., daily operations, typical tasks or job interviews), enriching them with contextual

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

information and making them available to the job seekers [1]. Such immersive experience aims to allow the user to train in unfamiliar situations, thus mastering the same real-world situations. The main question we investigate is how immersive technologies can help to activate job seekers, increase their interest in and understanding of workplace processes, and their knowledge and attitude towards job interviews.

Immersive technologies are being deployed for workplace training by several industries, for example, healthcare [2], construction [3] and manufacturing [4]. Different types of VR job interview simulations have been successfully used in the past, but mostly for specific target groups. For example, several articles report the use of VR for job seekers with disabilities, for example mental health issues. As early as in 2011, a study already reported a successful use of VR for job interview training of people with psychiatric disability [5]. Two more recent studies report increase of confidence and job interview skills [6] and that training in VR increase interviewing skills and trainees' obtaining a job offer [7]. At the same time, using VR available through head-mounted displays (HMDs) may lead to high eyestrain, which although still provide a better affordance for learning than a regular computer screen, as reported in [8]. Technologically, job interview training simulators can be implemented using different approaches, technologies and equipment. For example, it includes using multiple 2D video recordings, viewed on a flat computer screen, as in [7] or a simulated 3D environment with an interviewee character, as in [5] and in [9], or a simulated 3D environment available via an HMD interface, as in [10]. An alternative approach for creating immersive experiences is using 360-videos that can be watched both on a flat screen and in HMD VR. Our motivation for choosing the HMD-based 360-video mode for job interviews was two-fold: providing a relatively inexpensive but realistic and immersive recreation of the stressful situation that the job interview generally is and aligning job interview with the main Immersive Job Taste concept in VR.

The job interview training prototypes we present in this paper have been developed in two phases of a research project. In phase 1, we used rapid prototyping and low-cost techniques to map user needs. We developed and evaluated three applications for Google Cardboard: for health care, office work/startup and fish farming industry. Each of the three applications included a short industry-specific job interview experience. In the second phase of the project, we developed and evaluated a stand-alone industry-independent job interview training application InterviewVR. This application has been developed for Google Cardboard but evaluated on Samsung GearVR HMD. Local industries and public authorities provided materials for the study and advised on the job search process and recruited participants to evaluate our prototypes.

2 Design of Prototypes

Job Interview Experiences as Part of Immersive Job Taste. The job interview components were included in each of the three prototypes we developed in Phase 1 of the project (Fig. 1). All three apps were developed for Google Cardboard and contained (in addition to the job interview experience), interactive representations of workplaces, with simple gaze-based navigation. The job interviews were filmed using Samsung

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

Gear 360 camera. The resultant video files had the resolution 4096x2048 px and later compressed to 1920x960 px. The job interview in all three apps followed a simple scenario scheme: 1) an introduction of the interviewer(s) and the workplace; 2) few questions about the interviewee's background and interest in the profession; 3) an important question with three text-based answer options; 4) three different reactions of the interviewer to the answer options; 5) a summary with tips for a successful job interview in a specific profession. In 2) and 3), the interviewee asks a question and then 'listens' to the answer of the user for some time before continuing to the next question.

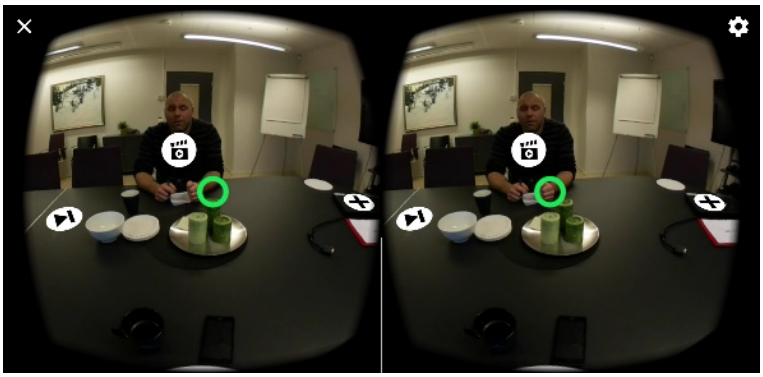

Fig. 1. Gaze navigation through the job interview (icons appear between questions)

The InterviewVR app has been designed to provide a generic immersive experience of a job interview with training functions, to function as a supplement to the industry-specific Immersive Job Taste simulations. In this application, we also used 360-degree videos, but improved several aspects based on the feedback received during the evaluation of the earlier prototypes. We filed using Ricoh Theta camera. The video files had the resolution 3840x1920 px, which we kept in the application. We recorded the sound from two sources. The ambient sound was recorded by the 360-camera, while the voice of the actress was recorded using an additional wireless microphone.

We significantly improved the scenario, both in the number of questions and branching methods. The InterviewVR simulation is based on a scenario that contains 12 main questions and 14 additional comments or questions that appear optionally depending on the answers to the main questions. All questions or comments were 360-filmed from the point of view of the user. In the scenario, the user takes the role of the job candidate and goes through a typical job interview. The app does not provide much guidance and instruction on how to perform at a job interview. Instead, the user is immersed into this situation and has to react to it by answering questions from the interviewer.

It is possible to record sound of the answers provided by the user, to make the experience of situation more realistic and to allow self-assessment and reflection by enabling a playback of the entire interview. While the user is speaking, a short 360-video clip with the interviewer actively listening is being looped.

In the design of the app, we did not use speech recognition and analysis, but still tried to make the experience personalized and realistic. We included / excluded some

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

of the questions (videos) based on several multiple-choice questions the app asks before starting the interview (e.g., about education and work experience) and based on the duration of the answer (e.g., if the answer time is shorter than a certain value a follow-up question is added). We also had questions where the user was given a hint in the form of three possible directions for developing an answer (Fig. 2). In these situations, the scenario develops further based on the chosen direction.

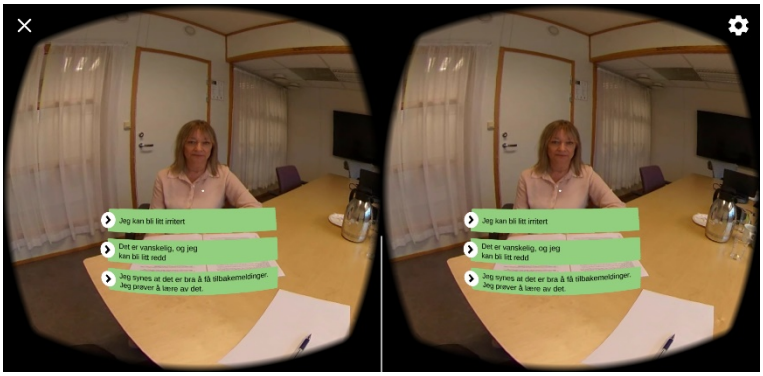

Fig. 2. Possible directions for developing an answer

After the user completes the interview, an option to play it back becomes available. The locally stored sound recordings of each answer are played over the same videos.

3 Evaluation

3.1 Research Design, Study Settings and Data Analysis

The primary target group of the study is defined as young job seekers, i.e. individuals aged 18 to 25 who are using welfare services, and are in most cases unemployed. Secondary target groups included high school students, job seekers of different ages and different welfare professionals. Each data collection session included a presentation of the Immersive Job Taste concept, testing our prototypes by the participants, and collecting feedback. In both phases, the questionnaire included three sections. The first section contained 10 questions about background. The second section contained 20 Likert scale questions about the specific apps and three open questions. The topics we evaluated included: user friendliness of the app (4 questions), usefulness of the app (4 questions), and possible future extensions (3 questions). The third section evaluated the Immersive Job Taste concept, which is outside of the scope of this paper, but reported in [11]. We used the same or similar questions in the individual and focus group interviews in all data collection sessions. In some of the data collection sessions, we used shorter versions, excluding some of the questions. The apps have been gradually improved between different sessions, so the results cannot be fully merged together.

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

All data were collected in lab settings with one of the developers assisting the participants in testing apps. Not all the participants answered all questionnaire questions. To analyze the data from individual interviews and focus groups, the project employed a method similar to theoretical sampling as it is described in Grounded Theory [12]. Individual interviews with young job seekers during phase 1 were analyzed using thematic analysis and thematic mapping [13].

3.2 Results

Job Interview Experience in Workplace Simulations. The questionnaire given to the participants (17 job seekers and 8 welfare professionals) of the final evaluation of phase 1 contained two statements on the usefulness of the job interview experience in each of the three apps: Q1. I could benefit from this app to feel safer at a job interview; Q2. The job interview in the app seemed realistic considering what questions were asked. Table 1 below presents the results of the answers to these questions for the fish farming, healthcare and office/startup applications.

Table 1. Usefulness of job interview experience in phase 1

	Q1 Fish	Q2 Fish	Q1 Health	Q2 Health	Q1 Office	Q2 Office
Strongly disagree	6%	6%	11%	0%	9%	13%
Disagree	17%	6%	0%	16%	18%	9%
Neither agree or disagree	11%	13%	16%	11%	23%	39%
Agree	56%	69%	58%	42%	45%	35%
Strongly agree	11%	6%	16%	32%	5%	4%
Number of responses	18	18	19	19	22	23

In the third part of the questionnaire, we asked one more general question related to the job interview. The statement “Such apps can make me more confident and prepared for a job interview” was evaluated more positively. From 17 participants who responded, 18% replied fully agree, 47% – agree and 35% – neither agree or disagree.

At the focus group interviews, the participants expressed concerns about the scenarios of the job interviews in the apps. It was noted that sometimes the interviewers were “rude”, but the interview scenarios were also “realistic”: “*It made you feel like he wanted to hire someone and was actually interested. It was more comfortable then. But not that comfortable, it's always scary at an interview…*” (job seeker, individual interview). One job seeker claimed that VR-interview training would have been useful for him a year earlier when he “*struggled a lot with anxiety, I think it would have been useful to calm my nerves before big interviews*” (job seeker). The welfare professionals were optimistic: “*Job interviews is a unique situation [...] but to be able to prepare, to have experienced it with such a tool [VR], that would help a lot*” (Welfare professional).

The participants thought it was a "cheap" solution that the interviewers asked a question, and one should answer with their own voice during a pause between questions. Many did not realize that they were supposed to talk in the pauses between questions.

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

The part of the job interview simulations where we used a branching scenario were evaluated very positively. The participants highlighted that it was useful to get feedback on what you answer, though it was noted that it was too obvious what was right and wrong answer and wished to have several answer alternatives to choose from.

Job Interview training with InterviewVR. In phase 2, the questionnaire data show a very positive attitude towards the app by both job seekers and welfare professionals. We used two statements to evaluate the usefulness of InterviewVR app: Q1. After completion I had a better understanding of what a job interview entails (only for job seekers); Q2. The job interview seemed realistic considering what questions were asked.

From 13 job seekers answered Q1, 69% selected strongly agree, 23% – agree and 8% – neither agree or disagree. From 23 job seekers answered Q2, 48% selected strongly agree, 43% – agree and 9% – neither agree or disagree. From 21 welfare professionals answered Q2, 62% selected strongly agree, 33% – agree and 5% – neither agree or disagree. None selected disagree or strongly disagree for both statements.

The data from the focus groups supports the positive responses to the questionnaire as job seekers have been more optimistic to the usefulness of the app towards the end of phase 2: "*If you are able to sit there [in VR] sincerely and answer well, then you'll probably be able to do it in a real job interview as well*" (job seeker). Some respondents considered the app potentially useful for them (not just for someone, which was the most common opinion in phase 1): "*I've probably been to four-five hundred job interviews and gotten four-five hundred 'no', so maybe I can use this to understand why I keep getting rejected*" (job seeker).

Two specific features were discussed in detail. Multiple choice (interviewer asking a question and user choosing one of three written answers) was viewed as too easy and did not let the user come up with their own answer. Replying orally (interviewer asking a question followed by a looped 'reaction' video where the user could answer) was viewed as awkward and did not give the user feedback, which was considered essential. This failure to incorporate feedback resulted in lack of "*interview feeling*". Multiple choice was preferred because feedback was considered of highest importance.

Further Development. The main features desired in the job interview simulations were increased realism and feedback possibilities. The participants wanted to know when they had done something right or wrong in the simulation.

For the InterviewVR app, it was suggested to increase the realism by creating several industry-specific interview scenarios instead of a single generic one. The participants also wanted the simulation to be adjustable to the skill level of the user with varying degree of difficulty (e.g., progressively stricter time restraint and feedback on tasks/questions). They suggested having a tutorial mode and having the option to turn "hints" off. The ideal simulation according to the participants should allow the user to talk with voice and get feedback on his/her answers, giving the users the same stressful feeling as during a job interview. A suggested improvement was to have the user answer a recorded question and then have a human trainer from behind the scene choose between two or more suitable pre-recorded responses. It was also suggested that with the

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

current version of InterviewVR it would help to agree in collaboration with a welfare professional on a profession or position beforehand and answer questions accordingly.

4 Discussion, Conclusions and Further Work

The study presented in this paper is highly cross-disciplinary and is in the intersection of the fields of VR, education, advisory science, psychology, and professional industries, made possible by a unique collaboration between academia, public sector and private companies. We demonstrated that relatively low-cost VR simulations made for experiencing job interview or for training job-interview skills can be a useful tool for the young job seekers and can help to mitigate some of their challenges. While there have been projects exploring workplace training and interview training in VR, little has been done to develop the solutions for young unemployed, something we consider as our contribution, as well as integrating job interview training with workplace simulations in VR as a part of the Immersive Job Concept.

Our study showed the importance of feedback during job interview training, especially on the consequences of the right and wrong choices to enable the users to learn from their mistakes for a more realistic and experience. The industry-specific scenarios were considered more realistic and potentially more useful, though their realism has been achieved at a cost of direct questions and (subjectively seen by some participants) rude feedback. The generic scenario designed with the welfare professionals was seen by the job seekers as better developed, but less realistic and too generic. Designing a scenario involving both industry and public authorities appears to be a good alternative.

For the immersive job interview training to be widely adopted, welfare personnel and k-12 teachers need to be trained to setup VR equipment and use the apps. This highlights the need for intuitive use interfaces, built-in guidance, easy installation and minimum required maintenance. The limitations of the study presented in this paper most importantly include a relatively small group of primary users and the fact that all evaluations have been done in laboratory settings.

The real-life evaluation outside of the lab is already ongoing and aims to explore how the job seekers and welfare professionals can handle the simulation with limited technical assistance, how much the simulation is used over time and if the using the simulation has an effect on the transition to work life. There is a need to further develop a coherent methodology, standards and templates for simplifying the development of the job interview simulations for different target groups, different languages and for industry-specific scenarios. This includes finding the optimal method for content development. While 360-video allows relatively cheap content production and provides a realistic experience, it lacks interactivity that is especially appreciated by the younger audience. A combination with 3D animations could be the optimal solution. Another alternative is to consider a non-immersive mode (flat screen) for the simulations based on 360-videos, which is the standard in most Google Cardboard apps. This would allow to address cybersickness and improve accessibility. Other technologies for increasing realism and improving feedback include speech recognition and other AI elements.

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

Acknowledgements. The project has received financial support from the Norwegian Labour and Welfare Administration (NAV). The authors would like to thank NAV employees H. Fossen, E. Kristiansen, N. Wulfsberg, M. Jaastad and young job seekers and welfare professionals who participated in the trials. Several NTNU students and employees have contributed to the project, including A. Perkis, S. Arndt and K. Øygardslia. We would also like to thank Trondheim Municipality and participating companies.

References

1. Prasolova-Førland E., Mikhail F., Ekelund O.I.: Empowering Young Job Seekers with Virtual Reality. In: 26th IEEE Conference on Virtual Reality and 3D User Interfaces, Osaka, Japan, p to appear. IEEE, to appear (2019)
2. McGuire L.S., Alaraj A.: Competency Assessment in Virtual Reality-Based Simulation in Neurosurgical Training. In: Alaraj A (ed.) Comprehensive Healthcare Simulation: Neurosurgery. pp. 153–157. Springer International Publishing, Cham, Switzerland (2018)
3. Lucas J.: Virtual reality simulation for construction safety promotion AU - Zhao, Dong. International Journal of Injury Control and Safety Promotion 22 (1), 57-67 (2015)
4. Grajewski D., Górski F., Hamrol A., Zawadzki P.: Immersive and Haptic Educational Simulations of Assembly Workplace Conditions. Procedia Computer Science 75, 359–368 (2015)
5. Bell M.D., Weinstein A.: Simulated Job Interview Skill Training for People with Psychiatric Disability: Feasibility and Tolerability of Virtual Reality Training. Schizophrenia Bulletin 37 (suppl_2), S91–S97 (2011)
6. Ward D.M., Esposito M.C.K.: Virtual Reality in Transition Program for Adults with Autism: Self-Efficacy, Confidence, and Interview Skills. Contemporary School Psychology, 1–9 (2018)
7. Smith M.J., Smith J.D., Fleming M.F., Jordan N., Brown C.H., Humm L., Olsen D., Bell M.D.: Mechanism of Action for Obtaining Job Offers With Virtual Reality Job Interview Training. Psychiatric Services 68 (7), 747–750 (2017)
8. D. Souchet A., Philippe S., Zobel D., Ober F., Lévêque A., Leroy L.: Eyestrain impacts on learning job interview with a serious game in virtual reality: a randomized double-blinded study. In: Proceedings of the 24th ACM Symposium on Virtual Reality Software and Technology, Tokyo, Japan, pp. 1–12. ACM, New York, NY, USA (2018)
9. Anderson K., André E., Baur T., Bernardini S., Chollet M., Chryssafidou E., Damian I., Ennis C., Egges A., Gebhard P., Jones H., Ochs M., Pelachaud C., Porayska-Pomsta K., Rizzo P., Sabouret N.: The TARDIS Framework: Intelligent Virtual Agents for Social Coaching in Job Interviews. In: Advances in Computer Entertainment, Boekelo, The Netherlands, November 12-15, Advances in Computer Entertainment, pp. 476–491. Springer International Publishing, Cham, Switzerland (2013)
10. Repetto C., Villani D., Riva G., Cipresso P.: May I experience more presence in doing the same thing in virtual reality than in reality? An answer from a simulated job interview. Interacting with Computers 24 (4), 265–272 (2012)
11. Fominykh M., Prasolova-Førland E.: Immersive Job Taste: a Concept of Demonstrating Workplaces with Virtual Reality. In: The Fourth IEEE VR Workshop on K-12+ Embodied Learning through Virtual and Augmented Reality (KELVAR), Osaka, Japan, March 23-27. IEEE, to appear (2019)
12. Glaser B.G., Strauss A.L.: The discovery of grounded theory: Strategies for qualitative research, vol 1. Aldine, New-York, USA (1967)

DOI: https://doi.org/10.3217/978-3-85125-657-4-12

13. Ekelund O.I.: Virtual work placement: How VR-technology can aid young jobseekers with career counseling and job search - a qualitative pilot study. Norwegian University of Science and Technology, Trondheim, Norway (2018)