Empowering Young Job Seekers with Virtual Reality

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ABSTRACT

This paper presents the results of the Virtual Internship project that aims to help young job seekers get insights of different workplaces via immersive and interactive experiences. We designed a concept of 'Immersive Job Taste' that provides a rich presentation of occupations with elements of workplace training, targeting a specific group of young job seekers, including high-school students and unemployed. We developed several scenarios and applied different virtual and augmented reality concepts to build prototypes for different types of devices. The intermediary and the final versions of the prototypes were evaluated by several groups of primary users and experts, including over 70 young job seekers and high school students and over 45 various professionals and experts. The data were collected using questionnaires and interviews. The results indicate a generally very positive attitude towards the concept of immersive job taste, although with significant differences between job seekers and experts. The prototype developed for room-scale virtual reality with controllers was generally evaluated better than those including cardboard with 360 videos or with animated 3D graphics and augmented reality glasses. In the paper, we discuss several aspects, such as the potential of immersive technologies for career guidance, fighting youth unemployment by better informing the young job seekers, and various practical and technology considerations.

Keywords: Virtual Reality, Career guidance, unemployment.

1 INTRODUCTION

Many young people in today's labor market are out of work and spend a lot of time playing games that give them the feeling of mastery and positive feedback. For this generation, technology is a natural part of life, they are keen to use digital channels and social media to get information about potential study possibilities and jobs. At the same time, traditional professions and channels of communication 'lag behind' digitally and often rely on text-only presentation modes, so young people feel uncertain about the path they should choose and how and where to get a job. The meeting with work life can be terrifying to some job seekers, especially those with social anxiety. Therefore, there is a need to explore new and more efficient ways to communicate with young job seekers through digital experiences and channels, as well as to facilitate engaging and safe working experiences.

Virtual and augmented reality (VR / AR) and gaming technologies can help to fill the communication gap between the industries and the young generation, for example, by providing a cost-effective and low-threshold alternative or supplement to internship placements using innovative technologies with gaming elements. In this paper, we report results of a study exploring this relatively new application area of immersive technologies.

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As part of related work, we can highlight that AR and VR are increasingly used in formal education where a traditional classroom is not enough [1][2]. These technologies make it possible to create engaging experiences for learning and training, especially in supporting collaboration, visualizing complex concepts or simulating learning situations that are difficult to practice otherwise. Use of games and gamification in education and training has been a widely accepted method for many years [3].

These technologies are becoming increasingly popular and are being deployed by several industries (e.g., mining [4], healthcare [5], construction [6] and manufacturing [7]) and have proven effectiveness in workplace training. Walmart has integrated VR training of employees as a part of their day-to-day operations: (https://blog.walmart.com/innovation/20180920/how-vr-is-transforming-the-way-we-train-associates). VR job interview simulations have been successfully used for job seekers with mental health issues [8][9]. There have been also attempts to develop apps for career guidance with 360 videos (e.g., SORTED application in India http://www.ilovemondays.in/sorted/).

VR and AR can be used to "capture" experiences of physical places and human actions and then present them to the user so that the experience is revived and revitalized [10]. Such capturing is a complex task. It may require a range of technologies applied in a laboratory setting, such as 3D scanning, motion capture and image recognition. However, experience capturing can also be done using wearable sensors in real operational environments, as for example in [11], to be applied for workplace training using AR. Capturing experience to be used in VR requires a different approach. Human actions can be captured with wearable sensors to animate an avatar, but the results of 3D scanning of a physical space cannot usually be used in VR without post processing. Other techniques can be used to capture spaces, such as 360 photos or photogrammetry [12][13].

Our contribution to research is the concept of 'Job Taste' – capturing experiences in the workplace (e.g., daily operations, typical tasks or job interviews), anchored in various work environments. Instead of communicating information about something, we aim to deliver applications and content that convey these experiences directly. The Job Taste concept was developed to (a) capture work experiences including physical space, human actions and some of the workplace culture, (b) enrich them with additional information and game elements, and (c) deliver them through interactive VR / AR experiences. Job Taste is different from workplace training as it only provides a 'peek' into a certain profession without necessarily covering all the details of the trade.

The VR / AR experience will allow the user to train in unfamiliar situations in a safe setting, thus mastering the same real-world situation with the goal of master the road to work. In this project, we investigate:

- How VR / AR can help activate job seekers, increase their interest in and understanding of workplace processes, and their knowledge and attitude towards job interviews.
- How VR / AR can be used by employers as a tool for presenting themselves to job seekers.
- How VR / AR experiences for job seekers can be integrated with existing unemployment office activities in a sustainable way.

2 SETTINGS

2.1 Virtual Internship Project

The goal of the research project presented in this paper has been to explore the potentials of VR, AR and gaming technologies for motivating and empowering young job seekers. The project has a strong focus on diversity and inclusion, is led by women and is targeted at increasing job market inclusion and participation among vulnerable user groups, such as youth with social anxiety and mental health issues.

The project went through two phases, and we report the results of the second phase in this paper. In the first phase of the project, we used rapid prototyping and low cost techniques to map user needs. Applications for health care, office/startup and fish farming industry have been implemented for Google Cardboard and evaluated. Interview and questionnaire data collected from the young job seekers and welfare professionals indicated a positive attitude towards the concept of job taste and job interview simulations, but also various problems in using the developed apps with Google cardboard (cybersickness, wearability issues, etc.).

In the second phase of the project, we implemented the same concept for the advanced equipment. The fish farming industry (with an extension to the fish processing industry) was chosen for further development due to its importance for the Norwegian economy. This resulted in the *FisheryVR* app for HTC Vive and a variant for Hololens. In addition, due to the positive feedback on the job interview simulations in the first phase, we developed the *InterviewVR* app simulating generic job interview for Cardboard or Gear VR using 360 videos.

The project has been implemented in collaboration with local industries, especially in the fish farming and processing sector. The local companies provided us with details of their day-to-day operations, 3D models, participated in 360 filming at their premises, and provided input to job interview scenarios.

2.2 Immersive Job Taste Methodology

The concept of Immersive Job Taste has been extended to a methodology for designing VR and AR applications for different industries or different workplaces [14]. The development of the methodology has been informed by the feedback form the participants in all trials we conducted in the project.

The Immersive Job Taste Methodology includes several components. A profession is presented through several typical and simple tasks, which are normally given to trainees. These tasks are first demonstrated and then simulated in one or multiple workplaces, so that the users can observe how the tasks are done and then try to perform them. The objective of such activity is to convey the feeling (or the taste) of the job and to build confidence, rather than to train. Therefore, the user should be able to try typical tasks, understand the key skills required to perform them and receive information about the workplace. Instead of assessment, feedback on achievements and errors should be provided.

The skills need to be linked to the tasks, for example, skills A and B are required to perform task X. Next, for each skill-in-task, indicators of successful and unsuccessful performance need to be defined to be used in feedback. For example, accuracy in fish sorting task is high if the worker can spot more or all defective fish on a fast-moving conveyor belt. The key skills should become types of points that users receive when performing tasks well. The same skill (or type of points) can appear in different tasks to better convey what it means in a specific workplace.

An actual workplace needs to be captured using technologies, for example, as discussed in section 1, or manually modelled. An actual worker needs to perform each typical task to be captured and included in the simulation. For each task, the user should first experience a demonstration of how the task is performed with some explanation. Next, the user should actively perform the task provided with immediate feedback on successfully performed actions or errors. Finally, the user should receive a summative feedback in the form of different types of points collected and brief explanations of their meaning in the completed task.

The FisheryVR app presented in the next section has been designed following this methodology.

2.3 FisheryVR Design

FisheryVR app allows the user to immerse into fish farming and fish processing workplaces and try out six typical tasks. The app simulates an area of a typical Norwegian fjord, including floating fish cages, a control and feeding station, a fish-processing facility on shore and a boat to travel between locations. The tasks include cage maintenance checks, remote fish feeding, fish sorting, packing and fillet cutting as well as health and safety tasks (Fig. 1 left).

Figure 1: FisheryVR screenshots (left) and the user (right)

FisheryVR app has been primarily designed for HTC Vive. The app can also be used on a Mixed Reality headset Samsung Odyssey. The app is developed in Unity 3D game engine and includes various simulated 3D environments, interactive objects and workplace situations representing typical fish-industry workplaces. The contents of the app have been designed under constant supervision and advice from the Norwegian fish industry: SalMar ASA, Måsøval Fiskeoppdrett AS, and Aqualine AS.

In this application, we designed the physical workplaces using detailed 3D models of the facilities and equipment which we received from the manufacturer. We captured the performance and descriptions of tasks using 360 videos, which were then placed in the virtual environment in the same (or similar) locations they were filmed. We included six typical tasks and six key skills (from 1 to 3 skills for each task).

2.4 InterviewVR Design

The InterviewVR app has been designed to provide a generic immersive experience of a job interview with training functions. In the design, we did not strictly follow the Immersive Job Taste methodology described above. However, the app is designed as a supplement to the immersive workplaces, such as FisheryVR.

The interview 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 in a single run from the point of view of the user.

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.

The application records sound of the answers provided by the user. This feature has two purposes: to make the user feel that the

situation is real and to allow self-assessment 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 personal and realistic. We included / excluded some 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 based on the chosen direction.

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

Figure 2: InterviewVR app.

3 RESEARCH DESIGN AND METHODS

This section outlines the research design and the methods we used in the Virtual Internship project. This paper presents the results of the second phase of the project and those related to VR.

3.1 Research Design

After concluding phase 1 of the project, we had evaluation data collected from 17 job seekers and 8 welfare professionals (career counsellors and the labour and welfare administration coordinators). These data were used to inform the research design and implementation in phase 2.

In the second phase of the project, we selected a single profession (fish farming) to concentrate resources and develop an application that can be evaluated outside of the lab in the welfare centers. We generated a new set of requirements based on the feedback received at the final evaluation of phase 1 and taking in consideration the new hardware (HTC Vive instead of Google Cardboard). At the same time, we decided to combine the job interview simulations (which were parts of each app on phase 1) into a separate app. We continuously collected user feedback on the two apps and the concept throughout phase 2 at eleven intermediate evaluations and one final evaluation (Table 1).

We used the same or very similar questions in the focus group interviews in all data collection sessions. We also used the same questionnaires, although in some of the data collection sessions, we used shorter versions, excluding some of the questions. It should be noted that the applications have been gradually improved between different data collection sessions, so the results cannot be fully merged together. However, the presentation of the concept remained the same throughout phase 2 of the project, and the data can be considered a single set.

3.2 Target Group

The primary target group of the study and of the project is defined as young job seekers. Under this term, we include individuals age 18 to 25 who are using welfare services, such as social or unemployment benefits, and in most cases unemployed. Representatives of the primary target group were 34 male and 21 female with median age 21.5. It should be noted that participation in the evaluations was voluntarily, and we observed a higher interest among male participants than female. Across the country, the gender difference in youth unemployment in small (male 10.8%, female 9.8%). We evaluated experience the participants had with gaming and with VR/AR. 49% agreed or fully agreed that they had much experience with gaming, while only 18% reported much experience using VR/AR.

Secondary target groups include high school students, job seekers of different ages and different welfare professionals. In addition, industry experts, researchers and university students participated in data collection. From these groups, we collected background information only for welfare professionals. In total, 10 male, 21 female and 6 unspecified gender professionals with median age 49 participated in data collection. It is important to notice that none of the welfare professionals replied agreed or fully agreed either to have much experience with gaming or with using VR/AR. 72% of them replied that they have little or very little experience with gaming and 86% with using VR/AR.

3.3 Data Collection

Each data collection session included a presentation of the Job Taste concept, testing our prototypes by the participants, and collecting feedback in different formats (column 4, Table 1).

Data collection during phase 1 of the project had a wide focus, evaluating participants experience with job search, with the Norwegian welfare-system, with games, VR and AR, the stereotypical young job seeker, their attitudes toward the concept and application of the concept.

In phase 2, it was the case only in our first evaluation (No.1 in Table 1). Later data-collection (from No. 2 in Table 1) focused more on evaluating the prototypes and their further development. We simply removed some of the questions from the interview guide and from the questionnaire.

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 (adapted for each app) and three open questions. The topics we evaluated included: user friendliness of the apps (4 questions), usefulness of the app (4 questions), and possible future extensions (3 questions).

The third section aimed to evaluate the Immersive Job Taste concept. It was adapted to job seekers (15 Likert scale questions) and welfare professionals (17 Likert scale questions). Both adaptations contained thee open questions. The main topics we evaluated included: usefulness of such VR/AR apps for example for increasing confidence, motivation and awareness about the workplaces (6 questions to job seekers and 5 to welfare professionals), if such apps should be offered at welfare centers and schools (2 questions for each group), if such VR/AR apps are fun and easy to use (6 questions to job seekers and 3 to welfare professionals) and if the participants would require technical assistance to use such VR/AR apps (1 questions to job seekers and 2 to welfare professionals).

Some of our data collection sessions were organized as part of public arrangements (e.g., Researchers' night, conferences and job fairs). Therefore, we provided short versions of questionnaires with only fewer questions (No. 4, 8, 9, Table 1). All data collection has been done in "lab settings" with one of the developers supervising the demo and then offering to fill in a paper questionnaire. Not all the participants answered all questionnaire questions.

Table 1: Data collection in phase 2 of Virtual Internship

No	Date	Participants	Data collected
1	01.03.2018	12 job seekers, 2 welfare professionals	Focus groups and questionnaires
2	19.04.2018	7 university students studying socio-economy	Focus groups and questionnaires
3	09.05.2018	1 Fishery expert	Individual interview
4	17.05.2018	13 PhD candidates and researchers	Questionnaires
5	23.05.2018	13 welfare professionals	Questionnaires
6	25.06.2018	9 industry experts	Questionnaires
7	10.09.2018	6 job seekers, 1 welfare professional	Focus groups and questionnaires
8	20.09.2018	7 high-school students	Questionnaires
9	28.09.2018	29 high-school students	Questionnaires
10	24.10.2018	6 job seekers, 4 welfare professionals	Questionnaires
11	30.10.2018	18 job seekers, 7 welfare professionals	Focus groups and questionnaires
12	26.11.2018	13 welfare professionals	Questionnaires

3.4 Data-analysis

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: "the analyst jointly collects, codes, and analyses his data and decides what data to collect next" [15]. Analysis of the data from phase 1 was the most thorough. Individual interviews with young job seekers during phase 1 as well as the individual interview with a fishery expert (No. 3, Table 1) were analyzed using thematic analysis and thematic mapping as described in [16]. The focus group interviews were analyzed less meticulously and coded to match the themes already uncovered in the thematic analysis of the individual interviews mentioned.

Questionnaire data were collected from the two main target groups (young job seekers and welfare professionals). These data were split into topics they evaluate and where possible analyzed together with the data from the interviews and focus groups. The data from other secondary target groups were analyzed separately and were used as additional indicators in specific topics.

4 RESULTS

The results are structured by topics described in Section 3.3. The results from the two the major focus groups are presented together.

4.1 The Typical Young Job Seeker

The typical young job seeker was described by the welfare professionals as an uncertain individual with low self-esteem and self-efficacy. They usually spend a lot of time playing video games and draw a lot of their self-confidence from their abilities in various games. They struggle with career choices and job search, because they have unrealistic expectations of work life, unsure of how to get hired, find interviews difficult, lack motivation, do not see themselves as relevant for potential employers and are unwilling to consider alternative career possibilities. "*I think many don't have the motivation they should have, because they don't believe in*

themselves. I believe many don't see themselves as relevant for an employer" (Welfare professional, phase 1).

The young job seekers were less pessimistic. They acknowledged that job search and career-choices can be hard, but not because of lack of self-confidence or an unwillingness to consider other career options. Rather it was the lack of information. The job seekers claimed that there are few sources of information, and many inaccurately depict the workday of professions. Many had stories of wrongful hiring as a result of inaccurate information prior to appliance: "*My general experience is that it is rarely a consistency between what is said and how it [the position] actually is*" (Job seeker, phase 1). They claimed that uncertainty always accompanied career-choices, and they never know what to expect.

Young job seekers and welfare professionals both claimed that this uncertainty leads many young people to choose professions according to what they already know, and that this decision is heavily influenced by friends and families.

Internships and company visits are held in high regard by the participants, as such programs yield practical information and experience. At the same time, they admitted that these programs have drawbacks, such as being time-consuming and logistically challenging. Repeatedly trying different internships can also have negative psychological effects on self-esteem, motivation and self-efficacy.

4.2 Experience of and Attitude Towards the Concept

4.2.1 Young Job Seekers

"*The possibilities of this project are endless*" (job seeker, phase 1). The only criticism was provided by a job seeker who felt that it was an attempt of The Norwegian Labour and Welfare Administration to be "*cool and hip*". Others used words like "*genius*", "*without limits*", "*a question of when, not if*" and similar praise to describe how they felt about the concept: "*I believe in a few years it will be one of the main tools used in job seeking*" (Job seeker, phase 1). In addition, it was claimed that the concept would be popular among a wide range of people: "*VR is the key to reach people. Both young people and technology enthusiast are interested in VR. They will come pouring in to try VR*" (Job seeker, evaluation 11).

There was a debate on what to prefer between VR built using 360-degree videos (as in InterviewVR) or using 3D-modelled environments (as in FisheryVR). The interactive VR had more "to do" (job seeker, evaluation 11) and gave more in-depth information about work tasks, while 360-degree video was more immersive because it showed real people in the real world doing real tasks, rather than animated surroundings and tasks (job seeker, phase 1).

4.2.2 Welfare Professionals

This group was also positive towards the concept, but for different reasons than the job seekers. Job seekers wanted to use the simulations to get information about professions/positions, while welfare professionals believed the main goal should be training and career-related self-efficacy increase, as self-efficacy "*is essential for everything!*" (welfare professional, phase 1).

They supported the idea of including the concept into their counseling and claimed that there were many existing programs where such apps could be incorporated. At the same time, the questionnaire data indicate that practically such integration might not be easy. We asked the respondents to evaluate two Likert-scale statements: "I would need help of a technically savvy person to use such apps as part of welfare system offer" (22 answered) and "It will be easy to integrate such apps as part of welfare system offer at my workplace" (8 answered). After reversing the scores for the first question and taking an average of the two questions, we found that 35% consider integration easy (agree and fully agree), while

31% consider it would be challenging (disagree and fully disagree). Many were unsure (34% answered neither agree or disagree).

4.3 User-experience of the simulations

Most participants found trying out our simulations enjoyable and engaging. The questionnaire data indicate that both job seekers and welfare professionals enjoyed both apps but still liked FisheryVR more. The table below depicts the answers to the question "I liked using the app" (Table 2).

Table 2: General evaluation of FisheryVR and InterviewVR

	Job seekers		Welfare professionals	
	Fishery	Interview	Fishery	Interview
Strongly disagree	2%	4%	0%	9%
Disagree	0%	13%	3%	9%
Neither agree or disagree	16%	39%	12%	14%
Agree	61%	30%	47%	36%
Strongly agree	20%	13%	38%	32%
Number of responses	44	23	34	22

It was considered important that the simulations were without bugs or other "annoying" features (e.g., lag, poor navigation-system and low graphics) as this broke the immersion and hindered insight into the professions. The number of bugs and annoyances reported at the interviews decreased with each version of the apps.

Using questionnaires, we evaluated the visual quality and quality of interaction. In Table 3, we provide average scores for the responses by two categories of participants to the same two questions (How would you evaluate the visual quality of the app? and How would you evaluate the quality of interaction in the app?), collected at evaluation sessions No. 1, 5, 7, 11, 12 (see Table 1).

Table 3. Quality of visuals and interaction in the apps

	Job seekers		Welfare professionals	
	Fishery	Interview	Fishery	Interview
Poor	6%	3%	0%	3%
Insufficient	14%	15%	0%	7%
Sufficient	33%	35%	21%	30%
Good	34%	29%	62%	40%
Excellent	12%	18%	17%	20%
Number of responses	50	17	21	15

4.3.1 InterviewVR App

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, phase 1). The job seekers in the evaluations (phase 1 and evaluation 2) had the prevailing opinion: "*useful for some, but not for me*". The reason being lack of realism. 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*" (phase 1). The enthusiasm has grown, as evident at the later focus groups (evaluation 9 and 11) where job seekers have been more optimistic to the usefulness of the app: "*If one could practice, then perhaps one would become more secure in one's answers in a job interview as well. 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" (evaluation 9). "*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*" (evaluation 11).

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, which according to some participants was an essential skill to practice. Replying orally (interviewer asking a question followed by a 'reaction' video where the user could answer the question) was viewed as awkward and did not give the user feedback, which was considered essential by several participants. This failure to incorporate feedback resulted in lack of "interview feeling". Of the two features multiple choice was preferred because feedback was considered of highest importance.

4.3.2 FisheryVR App

This app was generally the favored based on both interview and questionnaire data, regardless of version. The participants reacted positively to combining 360-degree informational videos with interactive job tasks in VR. The 360-degree videos made them feel more immersed in the workplace and profession, and the interactive job tasks were reported as engaging, fun and motivating. The videos gave insight into the workplace and the profession in general, while the job tasks provided specific insight into what the profession encompasses. Though none of the job seekers had previously considered working in fishery, some expressed desire to explore the possibility further: "*I have never considered that sort of workplace [...] it became a thought though [...] I am more curious towards it today than I was yesterday*" (evaluation 11).

For the FisheryVR app, we also evaluated perceived usefulness with four statements:
- The given tasks were realistic.
- The app motivated me to study this profession/workplace.
- I had a better understanding of the profession.
- The app gave me a better insight into how I shall perform typical work tasks in this profession.

In Table 4, we provide average scores for the responses by two categories of participants to the same four questions covering this topic, which were collected at evaluation sessions No. 1, 5, 7, 11 and 12 (see Table 1).

Table 4. Perceived usefulness of the FisheryVR app

	Job seekers	Welfare professionals
Strongly disagree	4%	1%
Disagree	6%	1%
Neither agree or disagree	21%	18%
Agree	41%	42%
Strongly agree	28%	38%
No. of responses	37	30

4.4 Further Development

4.4.1 General Aspects

Welfare professionals were very positive to the inclusion of game mechanics which they thought were a great way to "meet the youth" (phase 1). The job seekers were divided on the subject. Reward or punishment systems (e.g., points for good performance, no points/progression for poor performance) were met with optimism by some job seekers, who thought it could make the simulation more engaging and motivating and facilitate consequences for actions taken which would contribute to realism since "*on a workplace there are consequences for everything you do*" (job seeker, evaluation 1). Others were skeptical and claimed that it

would make the simulations more of a game for entertainment than a tool for receiving information and training. Punishments was also cautioned since they could discourage young job seekers with low self-esteem with thoughts like "*I can't even master the game*". Among the job seekers there was consensus on two questions: First, option to turn reward system on or off was considered a good idea. Second, the reasoning behind rewards (or no rewards) must be explicit, so users can learn from their performance and improve.

This desire to learn was quite explicit among informants and feedback on performance was widely requested. The users wanted to know when they had done something right or wrong in the simulation and suggested a system as simple as sound or a flashing of light to indicate correct or incorrect execution of task. Another suggestion was to have non-player characters (NPCs) such as colleagues or a boss telling when you did something correctly or incorrectly and explaining to the user how they can improve. The participants also claimed that NPCs would increase authenticity.

Realism was a large theme. Colleagues NPCs, realistic background noises, relevant narratives (first day on the job, internship-introduction etc.) and consequences for one's actions would all contribute to realism according to the participants. They desired an introduction or a guide through the simulations. They cautioned the use of text, since that could get boring. Instead they thought audio-instructions or 360-degree informational videos could be more engaging.

The participants 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.

4.4.2   InterviewVR and Generally Job Interview Simulations

The main features desired in the job interview simulations was feedback possibilities and increased realism. The ideal simulation according to the participants should allow the user to talk with voice and get feedback on his/her answers. This would give the users the same stressful feeling as they normally experienced during a job interview and therefore provide a suitable tool for training. An improvement solution presented at one of the interviews 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 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.

4.4.3   FisheryVR and Simulations of Workplaces

The suggestions for improvement focused heavily on content rather than quality. The participants requested more job tasks, such as truck-driving, receiving fish and hygienic tasks (e.g., washing of hands and putting on cleanroom suits, something that was partly implemented in the last version). The argument being that it would make the simulation more fun through variation, and the fishery expert interviewed (evaluation 3) also pointed out that more tasks gave the user a holistic insight into the workplace and could therefore be an effective training tool for managers and leaders.

The participants also claimed that similar simulations could be used for a wide variety of professions (e.g., farming, mechanical professions, construction, cooking, truck or bus driving, healthcare, engineer, day care, police, interior designer, flower decorator, waiter and store keeper, to name a few). There was a consensus that practical, hands-on professions would be easiest to simulate.

4.5   Applications for Virtual Internship and Job Interview Training

4.5.1   As a Job-searching Tool

The participants claimed that virtual internship could be useful to practice the contents of a job position and a explore the corresponding workplace which would make one more capable of giving relevant and competent answers in a job interview: "*It is more interesting for the employer if you actually know what the position is about. So that could be useful. Easier to show an interest*" (job seeker, phase 1). VR interview training was mostly considered to have two uses. First, to practice interview skills and increase interview-related self-efficacy – strongly advocated by the welfare professionals. Second, to calm one's nerves before important interviews – strongly advocated by the job seekers.

With our primary target groups, we evaluated if Immersive Job Taste apps can facilitate job search. Job seekers and welfare professionals filled in questionnaires after trying one of both our apps (evaluations 1, 5, 7, 10 and 11). In Table 5, we show their responses to statements:

- Q1: Such apps should be available at welfare centers.
- Q2: Such apps should be used for career guidance at schools.

Table 5. Evaluation of the apps by the primary target groups

	Job seekers		Welfare professionals	
	Q1	Q2	Q1	Q2
Strongly disagree	2%	2%	0%	0%
Disagree	5%	7%	0%	0%
Neither agree or disagree	14%	10%	3%	10%
Agree	26%	31%	30%	23%
Strongly agree	53%	50%	67%	67%
No. of responses	43	42	30	30

4.5.2   Helping with Career Choices

"*When you're standing there as a sixteen-year-old and don't really know what's going on out there it's really hard to make decision! [...] with VR you at least know a bit about what you could expect*" (job seeker, evaluation 11). The main strength of the concept according to participants is creating assurance: Interviewer: "A*ssurance in form of?*", Informant: "*Self-assurance in a way. That you feel prepared for what's to come, or what to expect at a workplace or in different situations*" (job seeker, phase 1). "*If I decide that I want to become a crane operator, I just jump into the app 'can this be a profession for me?' and then I find out 'you know what, this is awesome!', and then I go and deliver my CV, and see if I can get a position there, right*" (job seeker, evaluation 1).

Based on their experience working with young job seekers, welfare professionals and socio-economy students, felt that such increase in information and insight into professions could be used as a reality check for young job seekers who were stubborn about their career path when that path was not suited for them and their abilities: "*It is a nice way of giving job seekers a more realistic impression of different work settings [...]. You get the broad strokes of a profession, and then it's easier to know 'is this within my field of interests or not'*" (evaluation 2).

The participants pointed out that VR presents an excellent alternative to other informational sources used for company presentations, as it allows to deliver first-hand experience: "*If you speak with an employee you'll get their version of the workday, but if you try a simulation you'll experience it for yourself and would get deeper insight into a position*" (evaluation 3).

With high school students, we evaluated if Immersive Job Taste apps can help with career choices. The students filled in questionnaires after trying one of our apps (evaluations 8 and 9). In Table 6, we show their responses to statements:

- Q1: I liked using the app.
- Q2: The app is useful to understand profession or interview.
- Q3: The app should be used for career guidance at schools.

Table 6. Evaluation of the apps by high-school students

	FisheryVR			InterviewVR		
	Q1	Q2	Q3	Q1	Q2	Q3
Strongly disagree	4%	0%	4%	0%	0%	0%
Disagree	0%	0%	0%	0%	0%	0%
Neither agree or disagree	4%	17%	4%	8%	8%	8%
Agree	22%	57%	39%	69%	23%	15%
Strongly agree	70%	26%	52%	23%	69%	77%
No. of responses	23	23	23	13	13	13

4.5.3 Location for Utilization

The participants presented three options for where to utilize the job taste concept, each with their advantages and disadvantages. First, for private use at home, the advantages included comfort, unlimited usage and a social factor – one can easier share one's experiences with others. The disadvantages included more distractions, high cost and large size (room-scale, e.g., HTC Vive) of VR-systems. Job seekers explicitly claimed that they would rather have limited access to a room-scale VR at the welfare center than unlimited access to a simpler version (e.g., Google Cardboard) at home.

Second and third options were at school and at a welfare center. Both alternatives share most of the advantages and disadvantages. Accessing apps at an organization gives a more serious setting with fewer distractions. There is space and budget to offer room-scale VR equipment. The only downside is limited access. The unique advantage of usage during the school-years is early intervention. Many career choices are made during school years, and as the welfare professionals admit "*the Norwegian welfare system gets them [job seekers] too late. Something should have been done earlier*" (phase 1). Both schools and the welfare centers also have the capacity to combine the simulations with relevant counseling to put the information into perspective. The welfare professionals enthusiastically claimed that they have several exciting programs that could incorporate virtual simulations.

4.6 Challenges for the Job Taste Concept

Several general challenges and limitations of the Job Taste concept have been identified. Minor drawbacks to the technology include the cost the potentially large size, and its early stage of development. For the Norwegian Labour and Welfare Administration, size and cost are less important issues, but the job seekers have questioned the organization's competence in handling advanced technology. The nature of VR has been highlighted as a limiting factor. Most participants argued that the VR will never be able to simulate reality fully: "*However good it gets. You will, for example, with those controllers, never get the finger motoric you need in filleting*" (job seeker, evaluation 1).

5 DISCUSSION

5.1 Value and Limitations of Immersive Job Taste

While 'real-life' internships and company visits are an important part of the job-seeking process, they might be time consuming and logistically difficult. Failing an internship risks negative psychological consequences on self-efficacy and -esteem. Our participants believe that virtual internships is a low cost and time efficient tool and alternative to these programs that can be used to inform and give a certain degree of practical experience, while avoiding the potentially negative psychological consequences and wasted effort. As well as making the job searching process more motivating and giving the job seeker a more accurate image of the workplace and the position.

The drawbacks pointed out about VRs notable ability to entertain is that it could distract from the function of the concepts – to inform and train users. The participants also warned that VR-simulations could give an unrealistic fun impression of a profession and thus leading to unreliable career choices. Many professions have great variety in everyday work, and if a user interpret the simulation as the standard, it could give an inaccurate image of the profession in general. Due to technical and resource limitations it was impossible to recreate all the aspects of the workplace and implement all the features suggested by the job seekers, welfare professionals and employers such as fish smell, advanced haptic feedback and interaction with NPCs as well as representation of a broader array of working tasks within a virtual workplace (e.g., a combination of fish processing with logistics and sales).

5.2 Recommendations for Using VR and Immersive Job Taste as a Tool for Career Guidance

Information and insight into a profession or position gives certainty in one's ability to make the right career choice. Our participants felt that Virtual Internship could prevent them from making the wrong career decision and give them a better insight into a profession. In the following, we discuss some recommendations and trade-offs for developing engaging, realistic and efficient virtual internships:

Gaming elements: distraction vs engagement. It was pointed out VR experience could be too entertaining and could distract from the actual workplace. While some gamification and elements of serious games are necessary to engage the user and increase the feeling of mastery, care should be taken to balance the educational purposes and entertainment aspects.

The importance of feedback was emphasized on several occasions, especially on the consequences of the right and wrong choices to enable the users to learn from their mistakes. While simple feedback has been implemented in existing apps (reaction of the virtual environment, points assigned, sounds and different paths in the job interview), the literature and evaluation results indicate that more feedback is needed (e.g., reasoning behind achievements and errors) for a more realistic and educational experience. This includes the use of AI mechanisms for speech recognition and more adaptive feedback, NPCs to populate the workplaces and emulate co-workers and supervisors and the multiplayer possibilities for enable participation of welfare professionals and industry representatives in the simulation.

A variety of workplaces represented: To exploit and explore the full potential of the Immersive Job Taste concept, a variety of professions should be made available to job seekers. At the same time, not all professions are equally suitable for the concept. From the technological point of view, professions with predominantly manual labour are most suited. Such professions are also the ones most suited for our target group, according to the welfare professionals, i.e. young people with little or no education.

Presenting correct information about workplaces from the industry point of view: The industry representatives stressed the importance of representing not just the manual labour part of their workplaces but also other aspects including the office work, logistics and sales. To provide a more realistic representation of the workplace, aspects such as scale of the working space and number of people who work there, smell, weather conditions, strain of hard labour should ideally be present. This poses additional demands on the technological requirements and costs of development though needs to be balanced towards the need to develop several 'good enough' virtual workplaces for the minimal cost possible.

The importance of developing coherent methodology: There is a need to further develop the methodology, standards and templates for representing the central aspects of the Immersive Job Taste. This will allow to create new virtual workplaces quickly and efficiently and provide a consistent user experience. Ideally, after exploring a virtual workplace, the user could receive some certification for the given profession.

360-degree videos vs interactive VR: A part of developing the overall methodology is finding the optimal method for content development. While 360 video allows relatively cheap content production and provides a realistic representation of the workplaces, it lacks interactivity that is especially appreciated by the younger audience. There have been divided views which medium is preferable, a combination could be the optimal solution.

Deployment and practical use: For the Immersive Job Taste to be widely adopted, welfare personnel and school teachers need to be trained to use VR apps or apps need to be self-explanatory, with easy installation and minimum required maintenance.

Non-immersive alternatives: To address cybersickness and improve accessibility, it was suggested to consider a non-immersive alternative for the apps based on 360 videos, which is the standard in most Google Cardboard apps.

Replication considerations: App design should follow the Immersive Job Taste methodology (general atmosphere, key information, key competences and tasks, user interface aspects, feedback). The app should offer interactive experience, but not be as complex as on-the-job training. The VR hardware should allow free body movement and interaction using controllers. The evaluation should be done on at least two topics: use experience and perceived usefulness of the app (e.g., see Section 4.3).

6 CONCLUSIONS

On the overall, the results of the project received a very positive feedbacks from all the involved stakeholders. The vast majority (79% of job seekers and 97% of welfare professionals) of those who answered questionnaires agreed or strongly agreed that Immersive Job Taste apps should be made available to job seekers.

The companies will be able to use the apps for recruitment and initial employee training. The FisheryVR app has being demonstrated at various job fairs, conferences and career events and received several awards (e.g., Breakthrough Auggie Award finalist). Based on the results of further evaluations, additional industries and workplaces are planned to be developed, using the Immersive Job Taste methodology. The next step planned is to evaluate how the apps are used in welfare centers and correlate with the related industries in the region.

The project has made possible by a unique collaboration between academia, public sector and private companies. It is highly cross-disciplinary and is in the intersection of the fields of VR/MR, education, advisory science, psychology, and professional industries, such as fish farming. While there have been projects exploring workplace training and interview training in VR/MR, these have been mostly targeting established professionals and older demographics. Our approach of using immersive technologies to motivate, empower and inform young job seekers, giving them a 'job taste' of different professions, is therefore unique and innovative. In addition, simulation of the working tasks and workplace environment in the fish farming and processing industry is hardly explored.

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