Career Choice of Adolescents: Can occupational VR 360-degree Videos Facilitate Job Interest?

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Abstract: The recent increase in accessibility of stand-alone Head-Mounted Displays (HMDs) has been recognised by companies who use them for recruitment purposes. By filming employees on the job site with 360-degree cameras, jumping into an occupational environment via a HMD has become a possibility for young career seekers. However, career choice depends on various influential factors (e.g. socialisation, self-efficacy, norms, experiences or career choice readiness). Thus, the question arises how and if VR 360-degree videos for occupational orientation can play a supporting role in this process. The presented pilot study examines the effects of exposure to occupational VR 360-degree videos on the development of occupational interest. 41 students experienced a variety of occupational VR 360-degree videos in a classroom setting. A significant increase in job interest before and after exposure was found. Our results indicate a positive experience and favourable ratings towards the application as useful for career orientation and for providing occupational information. We conclude that VR 360-degree videos are a promising tool for gaining occupational information and initiate self-reflection. We suggest future research with larger cohorts using the same VR application to further investigate which features are regarded as helpful in career orientation for young adults.

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1 INTRODUCTION

The use of 360-degree videos to promote learning goals has been increasingly discussed in recent years (e.g. Janssen et al., 2016; Kavangah et al., 2016; Hebbel-Seeger, 2018). Compared to 180-degree videos, 360-degree videos are correlated with increased immersion as well as increased motivation concerning learning (Narciso, 2019). 360-degree videos are considered to have an added value when using head-mounted displays (HMDs), as they increase the experience of presence (Hebbel-Seeger, 2018). VR technologies are ascribed several advantages in the context of education, such as enhance knowledge or foster students' interest (Azhar et al., 2018). Inexpensive VR glasses, such as the Google Cardboard, introduce the possibility of purchasing several devices as a class set (Google VR, 2019). The generation of virtual environments enables students to easily access a variety of scenarios in a classroom context without facing difficulties such as inaccessibility or lack of suitable facilities within geographical proximity. Furthermore, the experience is available to all students, regardless of physical abilities. Students can get personally involved.

Over the past two years, VR 360-degree videos have been increasingly used by companies as part of their recruitment process. In order to give potential job candidates a first impression of professions, German Railway company, Deutsche Bahn, for example, uses VR 360-degree videos to present career opportunities as a construction engineer or electrical engineer (Deutsche Bahn AG, 2016). Students gain insight into experiences on an actual work site using a VR application.

Career choice is a complex process. It develops over time on an individual level (Super, 1990; Gottfredson, 1981). According to the expectancy-value model of career choice by Eccles & Wigfield (2002), external and internal factors influence the decision-making such as self-efficacy, socialisation, personal experiences, accessible information as well as the career readiness to be able to make a thorough decision (Hirschi, 2011). Thus, career choice is depending on very individual personal conditions. One predictor for occupational choice is personal interest (Eccles & Wigfield, 2002; Holland, 1997; Gottfredson, 1981). Holland (1997) describes personal interest

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for an occupation as expression of one's personality. Hirschi and colleagues (2011; 2015), discussing career readiness and career adaptivity, state that adolescents should have the opportunity to match their personality with actual tasks of a future career. Adequate occupational information is discussed as one important factor to foster career readiness (Hirschi, 2011).

Referring to a VR intervention in a classroom context, the same career choice intervention will be perceived very differently by two individuals depending on their personal experiences, expectations, values or the competence to make a career decision in general (Eccles & Wigfield, 2002; Holland, 1997; Gottfredson, 1981). However, Hidi & Renninger (2006) point out that personal involvement in a learning environment is a starting point for the development of interest in the context of learning in a classroom setting: A successful learning environment can be perceived as a motivating, positive experience and in line with personal needs. Further on, long-term interest can be initiated and vocational interest be strengthened (Krapp, 2005).

In Germany, career orientation is part of the school curriculum (Standing Conference of the Ministers of Education and Cultural Affairs in Germany, 2019). However, in each of the 16 German states, it is implemented individually, either as a learning objective across all subjects or as an own subject. In most of the federal states, various approaches are formulated as part of vocational orientation between 8th and 10th grade: information about different work and career opportunities, development of competencies to make a career choice, reflection of personal interests, learning about gender equality, career assessments, documentation of career paths, internships or extracurricular activities. However, how to achieve these goals and by which method, didactic approach or material is decided by the schools or even on an individual level by the teachers.

Since 2018, class sets of VR 360-degree videos are available free of cost for German schools with the aim of facilitating the above described career orientation goals. The VR 360-degree videos provide occupational experiences within a variety of professions. The videos can be used with own smartphones. However, the impact of integrating those novel presentation techniques on applicants remains unclear.

2 PRESENT STUDY

In the presented pilot study, we examine the effect of experiencing occupational VR 360-degree videos in a classroom setting on self-reported interest in a vocational occupation by young adults. We assumed that experiencing the HMD VR career orientation can promote individual interest in the explored vocational occupation. To examine our assumption, we conducted a study with a class sets of VR 360-degree videos that are available freely for German schools.

3 MATERIAL

In our study 26 different VR 360-degree videos were available for students to choose from. The videos were accessible via a smartphone application and displayed via a HMD (Destek VR Kit). The videos were all produced by a production company for recruitment purposes of different German companies. Printed information cards on each profession provided an overview of the selections to chose from. All professions were vocational training occupations of the German dual system. Students could choose out of the following professions:

- Technicians: Electronic Technician, Engineer for Air Traffic Control, Industrial Electronics Technician, Recycling and Waste Management Technician
- Transportation: Railway Worker, Driver, Engineer for Air Traffic Control
- Law Enforcement and Safety: Police Officer
- Healthcare: Nurse, Drugist, Management Assistant for Healthcare, Pharmaceutical Technical Assistant, Pharmaceutical Commercial Assistant
- Mechanics: Ship Mechanic, Metal Cutting Mechanic
- Sales and Marketing: Retail Management Assistant, Management Assistant for Insurance and Finance, Controller
- Hospitality and Catering: Hotel Industry Expert, Catering Expert, Cook
- Other: Cemetery Gardener, Shipping Management Assistant, Special Civil Engineering Works Builder, Skilled Civil Engineering Worker

All chosen videos offered a visit at the job site, allowing the students to either take on the role of an apprentice or to follow a worker's daily routine in one of the professions described above. The videos were designed to display the chosen occupation from a first-person perspective, thus allowing the participants to explore the typical environment they would encounter in a real-world setting when working in the respective field.

4 METHOD

Our research goal aimed to identify the effects of experiencing a VR 360-degree video on self-reported interest levels in the chosen occupation. We assumed that the VR experience enhances expressed interest towards the chosen profession based on the findings of Hidi & Renninger (2006). We further assumed that, if the VR experience is perceived as very positive, the increase of interest is more likely.

4.1 Sample

41 students (m=27, f=14) from two different 10th grade classes of a secondary school in Germany participated in the study. The students were on average 15.37 years old.

4.2 Procedure

Participants were informed that they were about to watch one of 26 different professions virtually from an employee's perspective in their real working environment. The students were informed by the provided cards about the different occupations to choose from and were instructed to select one. They then put on the HMD and experienced the video of their choice, with the length of exposure depending on the video, ranging from three to five minutes. Trials took approximately 15 minutes to complete. Before and after the VR session, the students were asked to fill out the questionnaires described in the following section.

4.3 Measures

In a pre-post-test design, interest in the self-selected professions before and after watching the VR 360-degree video was assessed via a 5-step-Likert-scale (with "1=not interested at all" up to "5=very interested").

To investigate the VR experience, participants were asked to fill out the In-game Scale of the Game Experience Questionnaire (14 items) by Ijsselsteijn (2013). The scale was chosen because it contains two items each on flow, immersion, competence, tension, negative and positive affects as well as challenge and was designed to assess a user's in-game experience directly after exposure. The questionnaire has been used in varied contexts to examine the digital learning applications (e.g. Janssen et al., 2016).

To gain a deeper insight into the individual experiences, we queried subjective ratings on the perception of the 360-degree videos with six custom items that the participants could rate on a five-step Likert-scale, with ratings from 1 ("strongly disagree") to 5 ("strongly agree"). The questions focused on the perceived influence of the VR experience on their occupational interest (*"The occupations became more interesting to me.", "My career aspirations have been confirmed by the VR experience."*), the value of the VR experience for vocational orientation (*"The use of VR-glasses facilitated comprehending everyday work life."*) and the overall usability as well as the attractiveness of the VR experience (*"It was easy for me to handle the glasses.", "The displayed occupations were more appealing to me than they were in other career choice events."*). To account for pre-existing interest levels, these were directly addressed (*"I was already interested in the presented job profiles before I used the VR glasses."*). We also captured sociodemographic data (age, type of school).

To analyse our data we calculated the differences between reported interest before and after the VR experience as well as effect size. Since the observed measures approximated a normal distribution, we conducted independent and dependent t-tests as well as simple means and standard variations to interpret subjective perceptions.

5 RESULTS

12 of the available videos were chosen (see table 1). We noted a high popularity for more widely known and generally popular occupations such as cook, retail management assistant and nurse while more specialised or less common fields, such as shipping management assistant, were selected with a lesser frequency.

Table 1: Overview of students' selection of video content.

Profession	Number of selections
Cook	7
Drugist	5
Retail Management Assistant	4
Nurse	4
Management Assistant	3
Police Officer	2
Industrial Electronics Technician	2
Engineer for Air Traffic control	2
Shipping Management Assistant	1
Mechatronics Technician	1
Hotel Industry Expert	1
Electronic Technician	1

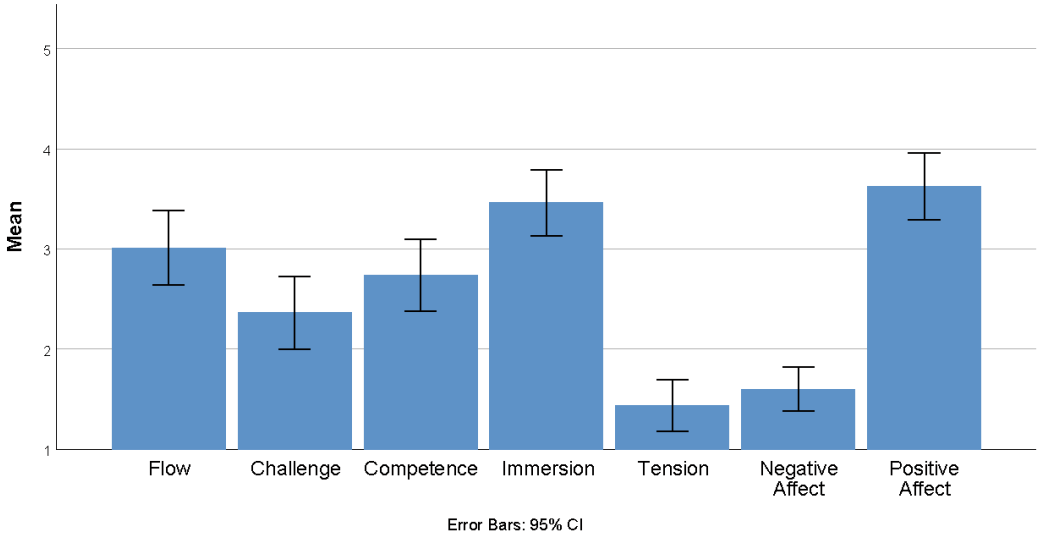

Figure 1: Means for each dimension of the Game Experience Questionnaire across all participants.

Analysing the pre-post data on interest, one participant was omitted from the calculation since he/she did not fill out the questionnaire, reducing the sample to 40 participants.

After having experienced the VR 360-degree video, 12 out of 40 participants reported an increase in interest (30 percent), 16 out of 32 showed no difference (40 percent) and 4 out of 40 participants stated a decrease in interest towards the selected occupation (10 percent). Eight out of all 40 participants were not able to recall the profession they had experienced and were therefore not able to give ratings on their interest on a pre-post item regarding the watched video. To investigate the correlation of interest before and after watching one of the VR 360 degree videos, we conducted a dependent sample t-test and measured the effect size using the Cohen's d. Interest ratings were higher after having watched the VR experience (M=2.906; SE=.221) compared to the interest ratings before exposure (M=2.531; SE=.238; $t(31)$=-1.929,p=.031), reaching significance while presenting a small effect (Cohen's d=.341).

To assess the perception of the experience, we evaluated the In-game scale of the GEQ by calculating means for the five-point Likert-scale according to the manual. The data of four participants were omitted from the calculation since they did not fill out the relevant part of the questionnaire. On average, students enjoyed the VR-experience (M=2.91; SD=.621; N=37). The means of the individual items further suggested an overall positive experience (see Figure 1). Students reported a positive affect, high immersion and flow. They reported less tension or negative affect. Since self-reported competence and challenge was neither the learning objective of the videos nor relevant for the main research question, it was not considered for the analysis. No differences in enjoyment were found when comparing female and male participants (independent t-tests). Furthermore, we found no significant correlation between in-game experience and interest in a profession after watching a 360-degree video. No correlation between in-game experience and failure to recall the selected profession could be observed.

Analysing the six custom items, participants perceived watching the 360 degree videos in VR a positive experience. Occupations were self-reported as more interesting compared to the students' interest before seeing the video (M=3.51; SD=1.344; N=41). The 360-degree video provided a deeper insight into the profession (M=3.71; SD=1.188; N=41). Students ascribed the VR 360-degree videos to facilitate comprehending everyday work life (M=3.63; SD=1.09; N=41). Students highly recommended the introduction of HMDs to school lessons (M=4.22; SD=1.15). They also perceived the application as easy to use and uncomplicated (M=4.1; SD=.982; N=41). However, students did not evaluate the VR experiences as an event that would have confirmed their career aspirations (M=1.80; SD=1.05; N=41). 15 of the responding participants already had a specific career aspiration. No video among the interviewees evoked universally positive ratings.

6 DISCUSSION AND LIMITATIONS

In our study, we conducted a pilot study with 41 students watching VR 360-degree videos via HMDs in the context of career choice. Out of 26 videos offering the experience of daily work environments from different vocational occupations, 12 videos overall were selected by the 41 participants. A significant increase in interest ratings regarding a chosen profession after being exposed to it via VR 360-degree video could be found, amounting to a small effect.

This finding is especially interesting since only about one third of all students reported an increased interest while the majority reported no changes. Only four students reported a decrease in interest. This suggests that students who already had a previous interest in a certain field might not have needed the additional insights the experience offered but that those who were unsure benefited greatly. Thus, the videos are perceived very differently, but provide an opportunity to match personal career aspirations with an actual task of a profession. Ultimately, the decrease in interest regarding a certain profession after a VR exposure might be a positive outcome for the student. Students might have realised that their initial interest and their expectation of their chosen profession were either met or not met by the actual requirements of the occupation. The employed questionnaire did not incorporate an assessment of the reasons for a positive or negative rating. We suggest to integrate items addressing a possible mismatch of previous expectations regarding the chosen vocation and the work requirements displayed in the VR 360-degrees video. We also suggest to replicate the study specifically targeting students who have not yet decided on a preferred vocation and who might benefit from the additional orientation and occupational information, to investigate its effects on job interest.

The comparatively high number of students who were not able to recall the selected profession, nearing 20 percent, was unexpected. In our sample, all of those participants were male. Due to the small absolute number of students unable to recall, no statistical link can be established. Since previous studies on career choice state gender differences (Wigfield et al., 2002) as well as research on computer games have observed gender differences in the perception of various game mechanics (e.g. Hartmann & Klimmt, 2006), an investigation of a possible link between gender and different experiences of VR 360-degree videos in the context of career choice with a greater number of participants might be worthwhile.

As our sample consisted of 41 students, coming from only two different classes at the same school, the vocational interest and video selection reflected the variety of personal interests of our participants. The selection of unique occupations by nearly every fourth student emphasises the importance to offer a variety of vocations to chose from. The selection of occupations was well received and proved suitable for adolescents exploring their career options.

Regarding the individual occupational fields each, a research design with more students interested in the same profession, using the same VR 360-degree video, could provide more useful data to investigate specific job interest. The provided videos only offered a brief opportunity to explore the selected fields further. The extension of video length could possibly further facilitate the development of interest and the evaluation of a specific field as suitable for one's own interests.

Additionally, precise learning objectives could be appointed such as self-reflection or selecting task specific information, and be evaluated. Some of the respondents were subsequently unable to assign a specific job title to the work environment they had experienced in the VR environment. Apart from possible interpersonal effects, this might also suggest that the purpose of watching the videos was not clear to all participants.

7 CONCLUSION AND IMPLICATIONS

Our results demonstrate that a VR 360-degree experience with a HMD in a classroom setting could strengthen interest in a profession and was mainly perceived as positive, thus confirming our assumption that exposure to a VR 360-degree video can facilitate job interest. The majority of the pupils stated that they had gained better insights into the chosen profession via the experience of the VR 360-degrees video and that they found the presented content interesting. Due to the highly individual and complex process of career choice, each video was perceived very differently by each student. Depending on various influential factors, all videos about job sights will be evaluated through a filter of an individual world of experience, standards, attitudes and abilities as well as a personal level of career readiness, which needs to be taken into account when evaluating the effects of occupational interest interventions.

On average, most of the participating students would recommend the use of VR 360-degree videos at school lessons. Apart from the described limitations, the VR experience seems to provide an insight

into a profession that otherwise might not be possible without further effort. VR-360 degree videos enable experiences at locations which young people usually have no access to plus more than one in short time. For instance, visiting the job sight of an offshore wind power plant is not possible due to safety restrictions (Spangenberger et al., 2019).

For future research, it would be of interest to investigate the influence of 360-degree videos in context of a non stereotypical career choice. In our study, only two male participants chose a profession in the field of healthcare, stereo-typically perceived as a female domain, while all students who chose the profession of a cook were male. In future research projects, the design and evaluation of VR 360-degree video features that promote specific job interest could be focused.

We conclude that the application of 360-degree videos for career assessment in a classroom setting is generally suitable to meet the needs of students in a career orientation phase. Watching different VR 360-degree videos can be a helpful tool not only to offer occupational information but also to reflect personal aspirations by exploring a diversity of tasks on the job site that might otherwise not have been associated with working in that field. Since they were well perceived by the target group, VR 360-degree videos have the potential to engage students in an learning environment that is perceived as motivating and positive.

Furthermore and in line with the literature on career choice, we suggest to not only focus on enhancing interest in a specific field, but to also specifically employ the VR experience to uncover possible mismatches between previous interests and the realities of occupational requirements. This could prevent young adults from choosing a non-suitable vocational training and therefore having to switch career paths later. Having VR 360-degree videos available for each student in a classroom gains new potentials in the field of career orientation. In our pilot study the experience was well received and regarded as helpful. We suggest further investigations with larger cohorts and also the exposure of each student to a larger variety of videos. We further suggest to embed the experience as a multi-faceted vocational orientation program focusing on self-reflection and discussion of the occupational information.

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