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ORIGINAL RESEARCH ARTICLE

Social presence as a training resource: comparing VR and traditional training simulations

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From immersive simulations to interactive tutorials, Virtual Reality (VR) is transforming the way we learn and practise new skills. Especially for social skills training, a growing number of simulations have been designed in which trainees learn to master difficult communicative situations. One of the factors to which the effectiveness of VR as a learning technology is attributed to is the users' feeling of social presence during the simulated interaction. This paper presents the evaluation of (1) a role play training, (2) a learning app and (3) a VR training application in a workshop series. Social presence was perceived as equally convincing and engaging for the prototypical VR scene as for the traditional form of role play, although the course of the interaction in VR was highly determined compared to the interaction dynamics of a human role play. In our interpretation, this confirms social presence as a valuable resource for training social interaction, which spans across various learning settings and methods in increasingly blended or hybrid learning and working contexts.

Keywords: social presence; experiential learning; virtual reality; social skills; learning engagement

Introduction

To interact in a socially skilled way is an endeavour many people believe to master intuitively. Due to the rising importance of communication in many businesses, there has been a growing demand for training offers that deal with communicative, interpersonal, or social skills. To date, these skills are mostly trained in analogue settings, for example, in workshops or role-play activities. However, digital solutions such as Virtual Reality (VR) are becoming increasingly popular for training communication or social skills. Despite the undeniable appeal of technology-based interactive training solutions, the advantages they offer compared to traditional methods remain uncertain. Therefore, the strengths and weaknesses of each modality need to be investigated in order to facilitate an appropriate application of the different learning modalities.

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However, any program aimed at training social skills must consider an important resource: the sense of social presence, which is experienced by participants in workshops as well as users of interactive technologies such as VR. This work aims not only to compare diverse forms of social skills training, but also to take a perspective on the ways in which these forms can be combined to fruitfully draw on the feeling of presence for learning purposes.

The potential for designing new virtual environments (VE) has been primarily realised in the realm of gaming. However, in the rapidly growing field of learning and professional training, the question of immersive experience has become increasingly crucial. Concepts of experiential learning (Beard and Wilson 2018; Kolb 2015) have been spreading, meeting the need of many students and professionals to acquire specific skills in a practical and possibly playful way. Based on these forms of experiential learning, educational approaches can be developed that enable the practical application of theoretical concepts and abstract knowledge to real-life scenarios.

Most of the hitherto developed VR applications for interactive training have been designed as simulations in which trainees engage in a role play either with virtual agents controlled by actors or trainers or with computer-controlled virtual agents (Fox *et al*. 2015). What though differentiates VR training simulations from non-digital forms of simulating social interaction? What are the advantages of applying this technology compared to other forms of experiential learning in this field?

This paper is based on a prototypical VR simulation for the training of social skills that was developed in a trans-disciplinary research project (Frankus *et al*. 2021). For our prototype, we chose a solution in which the interaction takes place between a human user and a virtual agent (Neundlinger *et al*. 2022).

At the end of the project, a series of workshops was organised in which participants had the opportunity to test the VR prototype and re-enact the same scene in the form of a role play. By completing a questionnaire, participants evaluated their feeling of presence in general – and social presence in particular – during the respective training experience.

Related work

Training modalities for social skills

As the cooperation within and beyond organisations is increasingly instilled by the need to coordinate with and involve others, the ability to adequately convey specialised knowledge, objectives or assessments as well as to take others' perspectives are preconditions for the success of many businesses (Edmondson, Casciaro, and Jang 2019). Organisational research has long investigated the role of communication as an activity that is central to any kind of process in organisations (Cooren *et al*. 2014). Furthermore, leadership is being conceived differently than in the past: besides declaring visions and assigning tasks, managers are expected to build respectful and empathetic relationships with their employees (Edmondson 2012; Holt and Marques 2012). Thus, nonverbal and emotional levels of communication are important for current organisational contexts.

These interpersonal requirements are often referred to as 'social skills'. Social skills are no longer considered as innate personality traits, but as something that can be developed and trained. Most current training programs take an analogue

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approach. In workshops (Bylund et al. 2008), concepts of social interaction can be shared and trained with other participants, enabling a pragmatic transfer of knowledge and practical experiences. Role play and other theatrical methods are used by trainers to integrate experiential elements in their seminars and courses (Nissley, Taylor, and Houden 2004; Schreyogg and Dabitz 1999).

VR & social skills training

VR has been gaining interest as a modality for social skills training, due to its capacity to deliver high levels of presence (i.e. the 'sense of being there'). Due to the possibility for users to interact with other agents in VEs, be they virtual or real (Waterworth and Riva 2014), VR shows promise as a medium to deliver highly immersive social skills training. In their meta-analysis on VR training programs for social skills, Howard and Gutworth (2020) found that VR training programs performed significantly better than non-VR training programs.

There are essentially two ways of utilising VEs for training social interaction: (1) role play applications, where users interact with other humans via avatars (Allen et al. 2020; Uhl et al. 2023), and (2) applications in which users interact with virtual agents that are controlled by computers via speech recognition and chatbots (Eckert and Mower 2020). Besides the possibility to train assertiveness and reflexive capacities in presentation and interview settings (Schmid Mast et al. 2018), it is the opportunity of perspective taking and developing empathy towards others that is quoted as a factor of VR's appropriateness for social skills training (Troeger and Tumler 2020). However, Howard and Gutworth (2020) concluded, that while VR has been confirmed as an effective tool for training social skills, the reasons for its effectiveness remain unclear.

The role of social presence

One rationale for the effectiveness of VR as a tool for training social skills is its ability to deliver high levels of presence – in particular social presence (Guimaraes *et al*. 2020). Social presence refers to the sense of co-presence, interaction, and engagement that learners experience with other virtual agents. Nowak and Biocca (2001) describe it as the 'level of awareness of the co-presence of another human, being or intelligence'.

Social presence can have a positive impact on learning outcomes by enhancing motivation (Robb and Sutton 2014) and the development of social skills such as communication, collaboration, and empathy (Zhao, Sullivan, and Mellenius 2014). Virtual training environments can be designed to facilitate the development of social presence through various features such as avatar representation, social cues, and real-time interaction. For example, the use of avatars that are representative of the learner and display emotions and nonverbal behaviour can help to increase social presence (Sajjadi *et al*. 2019).

Though social presence is primarily investigated in the context of VEs, it is a phenomenon that has also been ascribed to real world situations. For example, Gunawardena (1995) argues that both traditional and technology-based classrooms depend on social presence to improve effective instruction. Similarly,

Biocca, Harms and Burgoon (2003) argue that social presence is not dependent on a specific technology.

The significance of social presence in both virtual and analogue training for social skills appears crucial for enhancing the learning experience. By fostering a sense of co-presence, training VEs can offer an efficient platform for the development of social skills. To gain a deeper insight into how social presence manifests across diverse modalities for social skills training, we carried out three workshops that compared social presence and variables related to learning motivation across three training modalities.

Our research questions were therefore:

- **RQ 1:** How do the three training modalities differ from each other regarding social presence and learning engagement?
- **RQ 2:** What is the association of social presence with learning engagement?

Method

We developed an interactive VR scene aimed at training social skills in the workplace. This prototype was developed to verify hypotheses on the utility of this technology, as well as on aspects of the visual design of the virtual agent such as gender, age and realism. These hypotheses have been tested in a series of studies during the evaluation period (see Regal *et al*. 2022).

The aim of this work is to compare VR with other training modalities. In what situation might one be better suited than the other? Therefore, in a workshop series, we evaluated and compared different training modalities to assess their impact on variables related to social presence, learning engagement, and motivation.

Participants

The study was conducted on three separate dates of the project's concluding workshop series. Participants were recruited via the online channels of the project partners and via private networks of the involved partner organisations. A total of 27 (15 female) persons attended the workshops and completed the questionnaire. The mean age of the sample was 49.04 (standard deviation [SD] = 8.73), ranging from 31 to 67. Nine participants reported being in a management position. Twenty-one participants reported having a university or college degree. Five participants reported having some other form of tertiary education, and one participant reported a completed apprenticeship as their highest education level. The sample can therefore be defined as a convenience sample, tilted towards a high level of education. Since the target group for our social skills training are persons in middle management, our sample was highly representative for this group in terms of age and education.

Materials

Training modalities

A total of three training modalities were completed by all participants: (1) The VR training scenario, (2) a comparable real-life role play (RP) training and (3) a computer-based interactive application.

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VR training scenario. The VR experience was presented using an Alienware R4 Laptop and an HTC Vive Pro Eye head-mounted display in a separate room. A table in the room was positioned, so that it matched the position of a virtual office desk in VR. Participants assumed the role of a middle manager in their office (Figure 1, left). They received automated instructions for the scenario, stating that they had a scheduled meeting with an employee named 'Mira' (Figure 1, right) while a more pressing, spontaneous meeting with the board of directors had arisen. Participants would navigate the situation by choosing dialogue options with voice interaction (see Regal *et al*. 2022).

Role playing scenario. The role-playing scenario was a real-world equivalent of the dialogue in VR. Participants would in pairs of two get the script of the VR dialogue, one taking the role of the manager, one the role of Mira. The roles were switched until all members of a team had completed the Mira role. The role-playing sessions were guided by a member of the research team.

Interactive application. The third condition consisted of an interactive application, presented on laptops. This application consists of text-based descriptions of social situations / social dilemmas at the workplace and options of actions regarding that situation. The app was included as a control condition of a social training without social agents. Though colleagues and other people are described in the vignettes, there is no face-to-face counterpart which should result in a lower social presence.

Measures

Social presence. For measuring social presence, we administered Biocca's Net worked Minds Social Presence Inventory (NPSPI) (Biocca and Harms 2002), in an adapted version. More accurately, we only used the questions regarding the second order social presence, that is, the psycho-behavioural interaction. First order social presence describes the feeling

of being in the same space with a virtual agent. In the context of our training, this was not of primary interest, as we wanted to assess the extent to which the interaction with the virtual agent was perceived as realistic, as well as the question whether hypothetical emotions and thoughts of the virtual agent were apparent to the user. The NPSPI has good internal consistencies, with scales showing internal consistencies of alpha > 0.81, and the structure validity was supported by a confirmatory factor analysis. The NPSPI measures social presence by utilising the scales 'attentional

Figure 1. Office environment (left), virtual agent 'Mira' (right).

engagement' (3 items), 'emotional contagion' (1 item), 'comprehension' (3 items) and 'behavioral independence' (2 items). All items were rated on a 5-point Likert scale.

Learning engagement. The learning engagement-related questions were adapted from a similar study on effects of modality on presence (Persky *et al*. 2009). The resulting scales describe the 'approval' (6 items) of the training, 'information consideration' (3 items), and 'involvement' (1 item). A more nuanced analysis of training performance was not feasible due to the time constraints of the workshop as well as the VR prototype's limited content, which is why we opted to measure engagement-related variables, as this would indicate a willingness to use the respective training method. All items were rated on a 5-point Likert scale.

All used items for the respective scales of learning engagement and (social) presence are presented in Table 1.

Design

We opted for a 3 (modality of learning) × 1 (social presence / learning engagement) within-subjects design, as all participants tried out all modalities during the workshop.

Table 1. All items in the questionnaire for social presence (SP) and learning engagement (LE).

Social Presence	Attentional Engagement	I paid a lot of attention to the people in the scenario.
		I was easily distracted by the people in the scenario when other things were going on.
		I tended to ignore the other people in the scenario.
	Emotional Contagion	I was sometimes influenced by the moods of the other people in the scenario.
	Comprehension	The other people in the scenario were able to communicate their intentions clearly to me.
		The thoughts of the other persons in the scenario were clear to me.
		I was able to understand what the other persons in the scenario meant.
	Behavioral Independence	My actions were often dependent on the actions of the other people in the scenario.
		My behaviour was often a direct response to the behaviour of the other people in the scenario.
Learning Engagement	Approval	I would have liked to continue the training.
		The respective training was fun.
		I was satisfied with the respective training.
		I would want to use such a training again.
		The information provided was interesting.
		The information was presented in an entertaining way.
	Information Consideration	I paid a lot of attention to the information given.
		I tried to relate the information to my own life.
		I thought about how the information related to things I know.
	Involvement	Social skills training is important for me.

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The order was randomised naturally, as the stations were completed in a different order by the attendees of the workshop. For each independent variable, we performed a Friedman test. The resulting *p*-values were corrected using the False Discovery Rate (FDR; Benjamini and Hochberg 1995), which is a less conservative method of controlling for the increased risk of type 1 errors when doing multiple tests. When the Friedman test was significant, Nemenyi post-hoc tests were performed, to identify which groups differed from another by pairwise comparisons.

Procedure

Upon arrival, participants were received and introduced. The first part of our questionnaire, basic questions regarding demography and prior experiences with the training methods used in the workshop, was filled out. Afterwards we gave a presentation about social skills in the workplace. The general procedure of the workshop was explained, which consisted of the sequential completion of different learning stations in small teams. A total of 11 teams of 2–3 participants were created across the three workshop days, who then proceeded to split up to sequentially complete the scenarios at each station. The stations included (1) the *VR training* scenario, (2) the *role play training* and (3) the *learning app.* Upon completion of all stations, participants filled out the main part of our questionnaire, in which they would rate all statements on a 5-point Likert scale for each of the three training modalities. After a debriefing and feedback round with all participants, the workshop ended.

Results

The Friedman test, which is the non-parametric counterpart of a repeated measures analysis of variance (ANOVA), was chosen as the assumption of normality in most of the response variables was not met. The test was performed on all outcome variables regarding (social) presence, as well as learning engagement, in order to find out to what extent the three modalities differ from each other. If significant (after the correction), Nemenyi post-hoc tests were performed.

Social presence

For 'Attentional Engagement' the Friedman test was not significant ($\chi^2 = 5.047$, $p_{adj} = 0.107$). The test on 'Emotional Contagion' on the other hand rendered a Chi-square value of 12.538 which was significant ($p_{adj} = 0.004$). Post-hoc Nemenyi tests revealed a significant difference between the VR group and the App group ($p_{adj} = 0.038$), and between the Role Play group and the App group ($p_{adj} = 0.007$). Regarding 'Comprehension', the Friedman test resulted in a significant result ($\chi^2 = 19.271$, $p_{adj} < 0.001$), with the only significant difference between the Role Play group and the App group ($p_{adj} = 0.015$). The three groups also differed for 'Behavioral Independence' ($\chi^2 = 29.671$, $p_{adj} < 0.001$), in this case, as

indicated by the post hoc tests, between the VR and the App group ($p_{adj} = 0.008$), between VR and the Role Play group ($p_{adj} = 0.041$), as well as between the Role Play and the App group ($p_{adj} = 0.036$). Lastly, the test on presence (global) rendered a Chi-square value of 32.143 which was significant ($p_{adj} < 0.001$). The differences could be found between the Role Play group and the App group ($p_{adj} = 0.005$), as

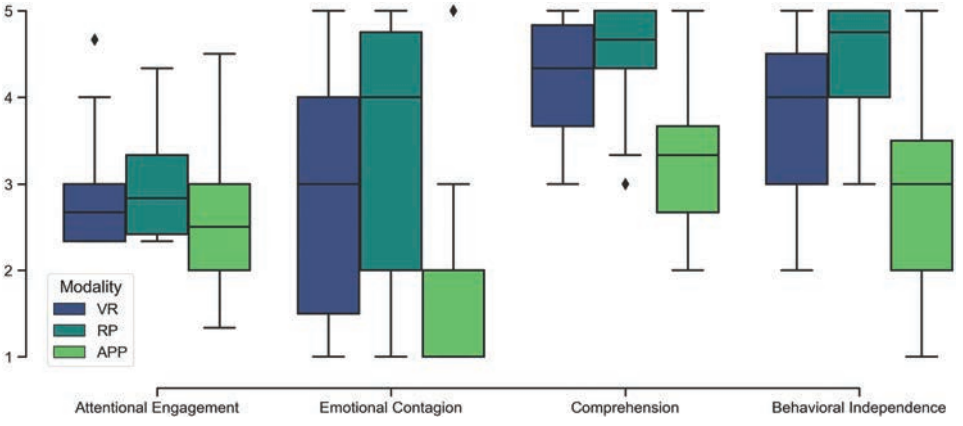

Figure 2. Boxplot for social presence variables across modalities.

Table 2. Presence rating per modality.

Modality	Attentional engagement			Emotional contagion			Comprehension			Behavioral independence		
	N	Mean	SD	*N*	Mean	SD	*N*	Mean	SD	*N*	Mean	SD
App	26	2.6	0.8	25	1.6	1.0	26	3.4	0.8	25	2.9	1.0
RP	26	2.9	0.6	26	3.3	1.6	26	4.5	0.6	26	4.4	0.7
VR	27	2.8	0.6	27	2.9	1.5	27	4.3	0.6	27	3.8	0.9

SD, standard deviation.

well as between the VR and the App group (p_{adj} = 0.004). Boxplots for social presence scales for all three conditions are presented in Figure 2. Means and SDs are presented in Table 2 and the results of the Friedman tests are presented in Table 4.

Learning engagement

No significant results were yielded from the Friedman tests on Information Consideration (χ^2 = 3.434, p_{adj} = 0.205) and Involvement (χ^2 = 0.824, p_{adj} = 0.662). For 'Approval' though, a Chi-square value of χ^2 = 9.595 yielded a significant result (p_{adj} = 0.013). The Nemyeni post-hoc test revealed that the difference was between the VR group and the App group (p_{adj} = 0.039). Boxplots for learning engagement variables for all three conditions are presented in Figure 3. Means and SDs are presented in Table 3 and the results of the Friedman tests are presented in Table 4.

Correlations

To assess associations of the (social) presence and the learning engagement variables, Spearman correlations were calculated for all main variables. The resulting *p*-values were corrected using the False Discovery Rate. Figure 4 shows a heatmap of all Spearman correlations, with the effect size r in the boxes. Whereas 'Attentional Engagement' does not correlate with any of the other variables, 'Emotional

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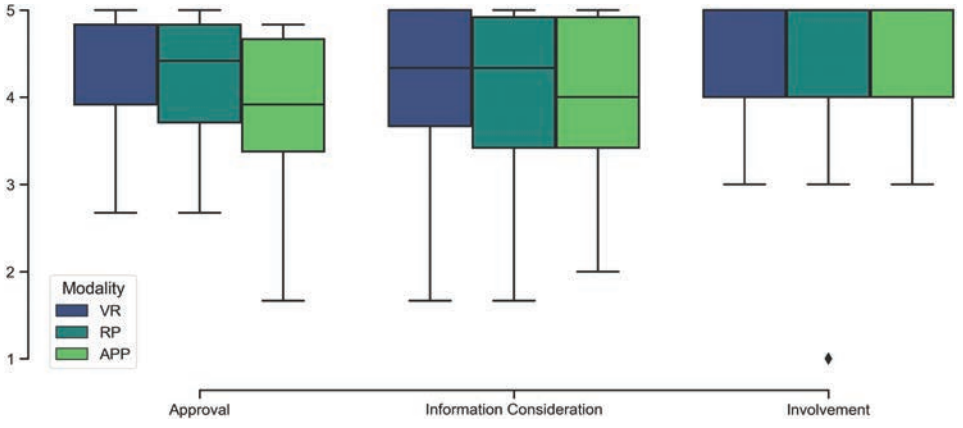

Figure 3. Boxplot for learning variables across modalities.

Table 3. Learning engagement ratings.

Modality	Approval			Information Consideration			Involvement		
	N	Mean	SD	*N*	Mean	SD	*N*	Mean	SD
App	26	3.9	0.9	26	4.0	0.9	25	4.4	0.8
RP	26	4.2	0.7	26	4.1	0.9	26	4.4	0.9
VR	27	4.4	0.7	27	4.2	0.8	27	4.5	0.7

RP, role play; VR, virtual reality; SD, standard deviation.

Contagion' ($r(25)_{emo/comp} = 0.34$, $p = 0.005$), 'Comprehension' ($r(25)_{comp/beh} = 0.62$, $p < 0.001$) and 'Behavioral Independence' ($r(25)_{emo/beh} = 0.45$, $p < 0.001$), all part of the same inventory, correlate significantly with medium to high effect sizes. 'Approval' showed medium positive correlations with the presence variables 'Comprehension' ($r(25) = 0.41$, $p < 0.001$), 'Behavioral Independence' ($r(25) = 0.48$, $p < 0.001$) and the global 'Presence' rating ($r(25) = 0.40$, $p < 0.001$). The only other association of a presence variable with a learning engagement variable was between 'Behavioral Independence' and 'Information Consideration' ($r(25) = 0.37$, $p = 0.003$), with a medium effect size.

Discussion

Three different training modalities were compared – (1) *role play training,* (2) *learning app* and (3) *VR training* – for the training of social skills by measuring ratings of social presence and learning engagement. We identified *social presence* (and *presence* in general) as being significantly correlated with the approval of the training. As this association was present irrespective of the compared modalities, we interpret this as a case for considering social presence as a resource to be generally used in social skills training. While in the existing literature and studies different types of training solutions in VR are analysed and compared, for example, simulations in which human beings interact with each other by controlling avatars (Allen *et al*. 2020; Fox *et al*. 2015), or VEs in which humans interact with computer-controlled virtual agents

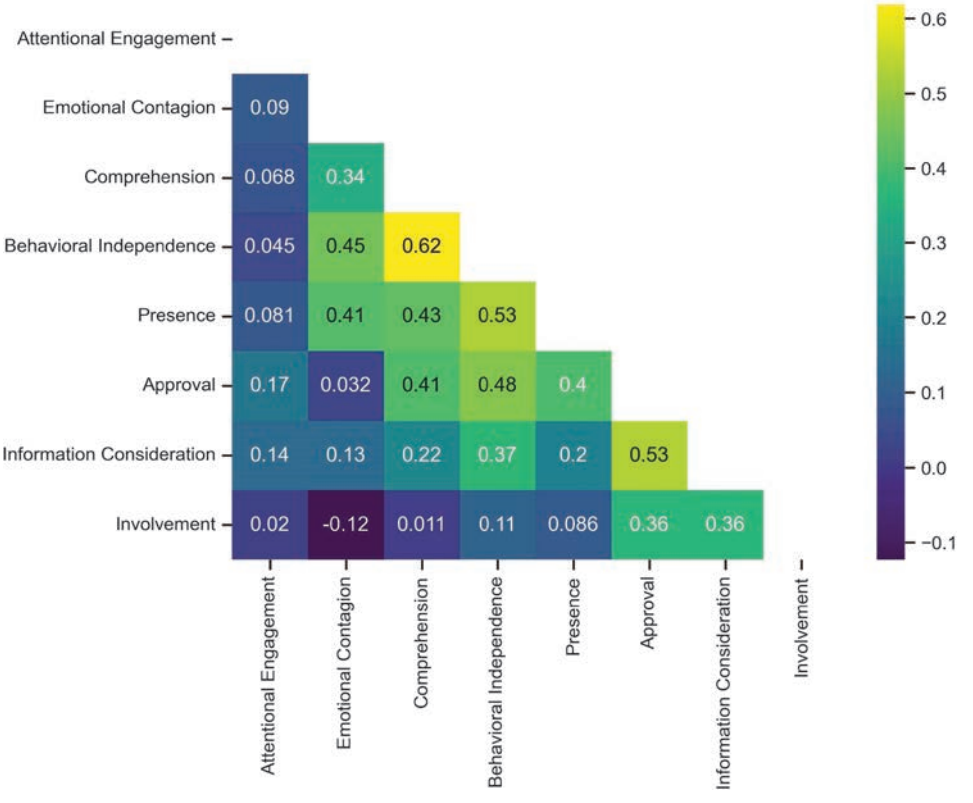

Figure 4. Heatmap of correlations between presence and learning variables.

Table 4. Results from the Friedman tests including the FDR adjusted *p*-values.

Scale	*N*	Chi-square	df	Asymp. sig	FDR adjusted sig
Attentional Engagement	27	5.047	2	0.080	0.107
Emotional Contagion	27	12.538	2	0.002	0.004**
Comprehension	27	19.271	2	< 0.001	< 0.001**
Behavioral Independence	27	29.671	2	< 0.001	< 0.001**
Presence	27	32.143	2	< 0.001	< 0.001**
Approval	27	9.595	2	0.008	0.013*
Information Consideration	27	3.434	2	0.180	0.205
Involvement	27	0.824	2	0.662	0.662

*$p < 0.05$; **$p < 0.01$.
FDR, False Discovery Rate.

(Eckert and Mower 2020; Lugrin, Pelachaud, and Traum 2021), we aimed at taking a more comprehensive view. In our interpretation, social presence functions as a resource in which individual or collective learning experiences are embedded and that allows to combine virtual and real-world settings for training purposes.

Taking a closer look at the results of our study, we can state that certain sub-facets of *social presence* differed significantly between (1) *role play training,* (2) *learning app*

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and (3) *VR training*: For *emotional contagion, comprehension, behavioral independence* and *general presence*, the VR prototype and the role play were rated equally high, whereas the learning app, in comparison, was rated significantly lower. While lower scores in *social presence* are to be expected in the case of a text-based *learning app*, the almost equal scores of *role play training* and the *VR training* prototype can be interpreted as indications of the suitability of the VR-based training approach, as it could evoke similar social reactions and assessments as the real-life role play training. The fidelity of the *VR training* prototype, although far from being perceived as realistic as an interaction with real persons, was confirmed to be sufficient for the participants to read the emotions of the virtual agent and get affected by them in a similar way as in the *role play training* – as indicated by the ratings for the variable *emotional contagion.* In addition, the high ratings in *comprehension* show that the content of what the counterpart said and, more importantly, meant or implied could be understood in VR as in real life. Regarding *behavioral interdependence,* the actions of the participants were mostly dependent and in high correspondence to what the counterpart said. This outcome is valid for *VR training* as well as for *role play training,* which is also a marker for an equal level of perceived social presence. These outcomes seem to confirm the appropriateness of VR training solutions in which humans interact with computer-controlled agents (Schmid Mast *et al*. 2018; Troeger and Tumler 2020).

While the degree of *emotional contagion* by the corresponding counterpart in the training scenarios had no effect on approval, the perceived comprehension of the counterpart (i.e. grasping what the counterpart says, wants or needs), behavioral interdependence (i.e. being influenced in one's behaviour by the behaviour or the utterances of the counterpart), as well as general presence factor were significantly correlated. Participants were more willing to continue the training when intentions of the counterpart could be understood, when it made a difference how they reacted to the interlocutor, and when they had the feeling of actually being in the situation. These seem to confirm the appropriateness of training in which human beings interact with each other, be it in VEs or in real-world settings (Allen *et al*. 2020; Mangham and Overington 1987).

Attentional engagement and *emotional contagion* did not correlate significantly with the learning engagement variables. However, attentional engagement and emotional contagion could be of importance when it comes to considering learning success and transfer. For a deeper understanding of social presence as a resource for (virtual) social skills training, further research is needed (Howard and Gutworth 2020). *Attentional engagement,* that is, how much attention the counterpart receives, did not differ between the three conditions. This is somewhat counter-intuitive, as one would expect training simulations with real counterparts to elicit higher amounts of attention, as a human face should serve as a salient stimulus for attention compared to a text-based scenario (Theeuwes and Van der Stigchel 2006). Related to our workshop setting, the equal measures for *attentional engagement* in all three conditions might be due to the script-based nature that was designed similar for the *VR training* scene and the *role play training* dialogue. Hypothetically, certain attention shifts might have occurred away from the interaction partner and towards the text base or script. The training of social skills should therefore consider a more naturalistic approach for the attentional parts of social presence to come to fruition. Also, these outcomes seem to confirm the appropriateness of avatar-based VR solutions (Fox *et al*. 2015) as well as of role play.

The prototypical *VR training* application achieved similar values compared to *role play training* in social presence. This is a positive indicator for social skills training in

VR because it confirms the hypothesis that virtual interaction partners (i.e. virtual agents) are perceived, by the users, as acting in a realistic and empathetic manner. On the other hand, the direct comparison with the *role play training* confirms the validity of avatar-based solutions as well as the appropriateness of traditional real-world settings that equally draw on social presence as a training resource. However, the question what makes an experience-based training program for social skills development successful and worthwhile cannot be reduced to a technological problem. Training experiences require a sound didactic concept in which theoretical knowledge is imparted and opportunities for reflecting and trying out are created, which is also confirmed by the results of the meta-analysis conducted by Howard and Gutworth (2020).

Limitations

The study's sample (well-educated, caucasian adults who mostly had a leading position in their respective workplaces) is not a representation of the general, diverse global population. However, the target group for the kind of social skills training investigated in this work is mostly middle management, which would resemble – to a certain amount – the study sample. Also, the study was conducted in a workshop setting and not as a controlled experiment. However, this allowed us to evaluate the usage in realistic workshop settings (external validity). Since most participants had little to no VR experience, novelty and excitement could be a confounding factor.

Also, cultural differences might play a role in the perception of others and social presence. Further research is needed, to meet the requirements of an ethnically and culturally diverse world.

Conclusion & future work

In this paper, we presented and analysed the results of a workshop series of a research project in which a prototypical scene for training social skills in VEs was designed. The workshops provided us with the opportunity to compare VR as a learning technology to other interactive methods such as computer apps or role play. Methods based on the simulation of direct interaction, such as role play and interactive VR scenes, are considered effective learning tools due to their experiential character. VR environments can create safe conditions for trying out various interactive strategies without the risk to harm other people or to feel ashamed because of their reaction. Hence, they draw on social presence as a resource for triggering individual learning experiences and processes. Instead of following a lecture, reading a book or watching a tutorial, learners are immersed in a communicative situation and directly experience the consequences of their interaction. Thus, a valuable outcome of the workshops was that interaction in computer-mediated environments like VR is perceived almost as realistic as in role plays.

In future work, we will study *social presence* and its influence on social skills training in a controlled lab setting, including qualitative methods, to gain deeper insights concerning the question why the training modalities were rated as they were. Furthermore, we aim to investigate training performance as an outcome of social presence. Here, the main challenge lies in the measurement of using, or performing

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with, adequate social skills in the natural environment of the participants, that is, their workplace.

Interactive technologies like VR provide us with new ways to draw on presence in didactic settings. Still, virtual training should not replace other didactic forms. Experiential forms of learning are a powerful tool, but have to be integrated in a sound didactic concept that allows for reflection, provides more general and abstract knowledge and prepares learners for implementing and experimenting the acquired knowledge.

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