

Fostering Teacher Educators' Intercultural Media-Related Competencies Using a Social VR Environment

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Recent studies suggest that teacher educators require intercultural media-related educational competencies to respond to contemporary and future educational needs. However, necessary professional development concepts, which are aimed at fostering these competencies, are underrepresented in current teacher education research. This study reports on the results of a case study within a Design-Based-Research project aimed at designing, implementing and evaluating a professional development concept to foster teacher educators' intercultural media-related competencies. A remote workshop using a Social VR environment was conducted with a convenience sample of 10 teacher educators. Data collected through a qualitative pre-post survey and a focus group was interpreted through qualitative content analysis. Findings showed intercultural aspects were addressed in several domains as well as an increased ability to evaluate potentials and risks related to interculturally focused teaching and learning with Social VR.

Introduction

In the field of Teacher Education research, there is consensus that a central responsibility of Teacher Educators (TEs) is to prepare future teachers for teaching in a world characterized by increasing digitalization (Foulger et al. 2017). Similarly, TE are also seen as key enablers of intercultural competence (IC) development for preservice teachers to deal with growing societal diversity (Moloney & Turunen 2020, 139). Accordingly, TEs require PD in both areas (Förster et al. 2021). Media pedagogical competency frameworks constitute an essential basis for the design and evaluation of PD programs for TEs (Tiede 2020). The Teacher Educator Technological Competencies (TETCs) Framework (Foulger et al. 2017) presents a media pedagogical requirement profile that, with TETC 8, also includes the performance of TE in transnational contexts. The promotion of preservice teachers' intercultural media-related competencies using a social virtual reality environment (SVRE) showed that the pedagogical concept designed to facilitate learning within a SVRE which offers distinctive characteristics (Shin 2018) were particularly conducive to the development of participants' intercultural media-related competencies (Förster et al. 2021). However, research is needed implementing the pedagogical concept within a SVRE with the target group of TEs. Accordingly, this case study was guided by the following research questions:

RQ1: What benefits and risks do TEs identify regarding learning experiences to promote IC using social VR?

RQ2: To what extent were IC aspects addressed by a pedagogical concept aimed at fostering TE's intercultural media-related competencies?

Literature Review

Using VR to Promote IC Development

Although IC remains an elusive construct (Deardorff 2006; Deardorff & Jones 2009; Spitzberg & Chagnon 2009) and numerous alternative nomenclatures co-exist (Fantini 2020; Deardorff & Arasaratnam-Smith 2017; Förster & Grafe 2021), it is widely understood as the ability to communicate effectively and appropriately in intercultural situations

based on one's intercultural knowledge, skills, and attitudes (Deardorff 2006). Following an open process-oriented concept (Förster & Grafe 2021), cultures can be described as shared knowledge, practices, attitudes, whereby individuals may relate to them differently (Barrett et al. 2018a). Moreover, individuals belong to different cultural groups at the same time (Bolten 2016). Thus, dialogical negotiation processes between individuals of different cultural affiliations are of particular importance (Council of Europe 2008). The Reference Framework of Competencies for Democratic Cultures (RFCDC) (Barrett et al. 2018a) is a model developed for school contexts, TE in higher education (HE), and PD contexts to facilitate and assess (Barrett et al. 2018b) participatory dialogic competency development among individuals of different cultural affiliations (Barrett et al. 2018c).

VR may be particularly suitable for promoting IC of learners due to its distinctive characteristics and their corresponding perceptions such as immersion, social presence (cf. Oh et al. 2018; Wei et al. 2022; Zhao et al. 2018), embodiment, and agency (Akdere et al. 2021). Other motivations for the use of VR to support IC development include resource and location convenience (Akdere et al. 2021; Shadiev et al. 2020; Wienrich et al. 2021), as learners can be exposed to contexts, situations, and interactions in which they can experience cultural difference when mobility is not possible. Safety and ethical considerations are equally stressed, as socially and affectively demanding communication can be practiced without harmful consequences (ibid.). However, findings by Akdere et al. (2021) indicate that an immersive experience in VR alone does not necessarily lead to IC development, but should be paired with reflection. Duration and pedagogical design of the experience also influence the learning outcomes related to IC (Akdere et al. 2021). However, meta-studies on VR in higher education show that this medium is mostly used only for short, isolated learning phases (Hamilton et al. 2021; Huang et al. 2021; Mystakidis et al. 2021). Moreover, learning theory and other pedagogical foundations are mostly left out (Calvert & Hume 2022; Pellas et al. 2021; Radianti et al. 2020). In HE learning contexts, empirical studies (Ripka et al. 2021; Ripka et al. 2020; Schröter et al. 2021) have already demonstrated the effectiveness of pedagogical concepts using action- and development-oriented media pedagogy (Tulodziecki et al. 2021). Findings of an exploratory study (Förster et al. 2021), using a pedagogical concept adhering to the same media pedagogical foundations with the aim of fostering intercultural media-related competencies of pre-service teachers indicate that learners perceived a strong sense of social presence and safety when interacting with peers in a fully immersive SVRE. Furthermore, learners stated that they felt a sense of individual and collaborative agency during virtual object manipulation tasks (ibid.). Notably, participants upon reflecting their own immersive experience articulated that they saw potential for initiating perspective taking processes leading to increased empathy among their own students (ibid.), which is in line with recent research on empathy building in VREs (Shin 2018; Ventura et al. 2020). Several review studies in K-12 and HE suggest that learning environments with immersive VR can enable the achievement of cognitive, skill-oriented, as well as affective learning goals (Hamilton et al. 2021; Radianti et al. 2020), with review studies in TE also supporting this (Billingsley et al. 2019; Huang et al. 2021). As a desideratum, this raises the question of whether a pedagogical concept using an SVRE can also promote IC as supported by TETC 8 (Foulger et al. 2017) and modeled by the RFCDC (Barrett et al. 2018a).

PD for TE Focusing on IC Development in ICT-enabled settings

Notably, the research results presented above do not refer specifically to TEs, but also to K-12 and HE students. This gap is consistent with arguments that TEs remains excluded from the IC development of preservice teachers and professional learning trajectories of TEs are often less formalized but personal and unique (Biesta et al. 2022). The need for PD measures that explicitly address TETC 8 (Foulger et al. 2017) is exemplified by recent studies, which show that TE rate their own competence in this regard comparatively low and are ambivalent about the relevance of TETC 8 (Carpenter et al. 2020). To date, there is one study that aims to foster TETC 8 (Slykhuis et al. 2020). The PD program on the TETCs is a Massive Open Online Course (MOOC) comprising multiple modules. In the module dedicated to TETC 8 it is stated that teachers intercultural and educational competency development requires social learning in culturally diverse learning environments (cf. TETC PD Program 2021). However, assuming that TEs also develop IC best under these conditions, this PD program does not yet fully address this gap. Accordingly, further research on the development and empirical evaluation of a PD concept for TEs focusing intercultural ICT-related pedagogical issues is needed.

Theoretical Framework and Pedagogical Concept

The pedagogical concept in this study is based on an action- and development-oriented approach to teaching and learning with and about media (Tulodziecki et al. 2021). This approach envisages a learning cycle over 8 phases, in which, situatedness based on a task relevant to learners as well as collaborative solution and reflection are essential

features (ibid.). This is linked to the model of Interculturally Anchored Inquiry (Kammhuber 2010) and Bosse's model of intercultural communication (2010), which are also characterized by authentic situatedness and social constructivist features. The design of the complex tasks for this PD also draws on intercultural PD research (Scheitza & Leenen 2019; Hiller & Vogler-Lipp 2010) and intercultural dialogue (Helm 2016; Deardorff 2019).

The objective of the PD was to promote TETC 8(a) "[m]odel global engagement using technologies to connect teacher candidates with other cultures and locations" (Foulger et al. 2017) using the fully immersive SVRE ViLeArn (Latoschik et al. 2019; Kern et al. 2021), which has been enhanced (Hein et al. 2022) by an Interaction Suitcase comprising 3D objects which allow for interculturally focused collaborative learning activities.

In advance of the PD all participants received their own VR sets (Oculus Rift S HMD with hand controllers and a gaming notebook respectively) and were invited to a course in the learning management system (LMS) of the university where the SVRE software as well as written instructions, video tutorials, a tech-support forum and a video-conferencing system for synchronous support were. All learners were prompted with an avatar configuration task prior to the synchronous session in the SVRE.

In adhering to action and development-oriented media pedagogy (Tulodziecki et al. 2021), learners met in the SVRE (Fig. 1) and were introduced to a critical incident (CI) as a complex design task, i.e., a complex and ambiguous interaction situation focusing on potential intercultural discrepancy experiences of a TE and a group of international students (adapted from MUMIS n.d., cf. Knapp 2014) at the beginning of the SVR phase in plenary. The pedagogical concept envisages that learners initially become discursively aware of the meaning of the CI for themselves as TE and that the spontaneous articulation of spontaneous thoughts and proposals for solutions, a common understanding of learning goals and the course of action to achieve these goals are facilitated.

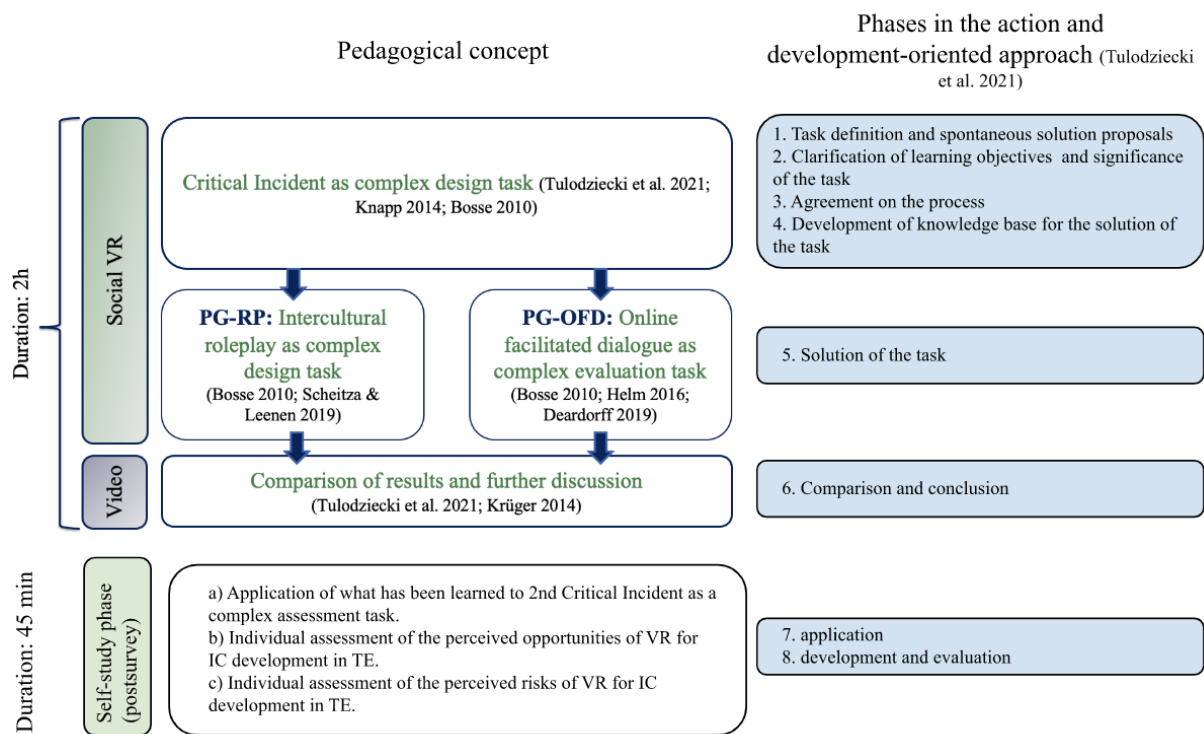


Figure 1 Pedagogical concept based on the action- and development-oriented approach (Tulodziecki et al. 2021).

Next, the TEs were presented with the structural model of intercultural communication (Bosse 2010) and in the context of an interactive facilitated group discussion, the TEs related the analysis criteria of this model to the CI in order to build essential knowledge foundations for the solution of the following group task. Afterwards, the group was divided into two subgroups to collaboratively develop a solution in a separate room of the SVRE. In PG-RP, learners carried out an intercultural roleplay as a complex design task, in which the TEs embodied avatars who resembled the protagonists of the CI. Following the works of Scheitza & Leenen (2019) and Bosse (2010), who characterize intercultural roleplay as an active method that is particularly conducive to affective learning, TEs in this PG were asked to put themselves in their character's place and then act out scenically how the interaction between the

characters might proceed. TEs assigned to the other small group, PG-OFD, accompanied by a facilitator conducted online facilitated dialogue as a complex evaluation task. According to Helm (2016) or Deardorff (2018), this process supported by impartial facilitation, offers learners the opportunity to bring together multiple perspectives, to critically evaluate them and to work together in a protected setting towards consensus and solutions to complex problems. The TEs in this group embodied avatars with different social cues but spoke as themselves in the dialogue about the CI. In accordance with phase 6 in the action and development-oriented approach of Tulodziecki et al. (2021), the pedagogical concept provides for a comparison of the results and learning experiences as well as an in-depth reflection on what has been learned. In order to ensure a clear distinction between learning actions in the SVRE and the metacommunication about them afterwards and to prevent the emergence of cybersickness, immersion was broken after phase 5 according to Tulodziecki et al. (2021) by a change of media. The time frame of the PD workshop had to be condensed to a total of 2h in order to respond sensitively to the high workload and limited time capacities of the intended target group.

Methodology

The PD was conducted with a convenience sample of n=10 TEs from 5 faculties of a German university. The group was composed of equal numbers of women and men. 9 of the participants were novice teacher educators as well as doctoral students. All participants had previous expertise in areas related to media pedagogy depending on their disciplinary affiliations and knew each other before the workshop. While n=6 of the participants had attended a 4-hour PD program fostering the understanding of the affordances of social VR for higher education as well as pedagogical concepts (Schröter et al. 2021) just before the intervention of this study, n=4 of the participants did not have any prior experience with PD in VR. Before the start of the workshop module under investigation, learners were randomly assigned to one of two parallel groups the consideration being to ensure that there was a balance of TE with and without prior VR experience in both groups. PG-RP consisted of 5 participants and PG-OFD of 5 participants.

The research methodology builds on a qualitative approach with qualitative measures applied before the start of the intervention, during the intervention and afterwards. As we wanted to explore the realization of intercultural roleplay and intercultural facilitated dialogues without having the option to design a separate comparison group, we decided to integrate both features into the intervention. Since dialogic phases with the entire learning group were still a defining social form during the intervention, we only emphasize results regarding PG-RP and PG-OFD in an exploratory way.

Qualitative data were collected via two instruments. First, we designed a pre-/postsurvey with open questions to open up a wide angle for respondents' perceptions but allow them to focus their answers (Braun et al. 2021). To answer research question 1, the TEs were asked to answer the following questions related to perceived opportunities and risks of VR for promoting intercultural media-related competencies in teacher education:

- a) What opportunities and potential problems do you see for teaching and learning with virtual reality in higher education?
- b) What opportunities and possible problems do you see specifically for interculturally focused educational designs using virtual reality?
- c) In which educational contexts would you use VR in your teaching, and in which would you not?

In the postsurvey there was also a question about the evaluation of the PD Workshop. To answer research question 2, we asked the participants in the pre-/postsurvey to analyze a second critical incident (Hiller 2018) and to describe how they would proceed in the same situation. TEs were prompted with the following questions adapted from (Hiller 2018):

- a) To what extent do you consider this interaction to be interculturally significant?
- b) Which aspects could have led to irritation in this interaction?
- c) How would you, as a teacher educator, respond to this situation?

As a second qualitative instrument, focus group questions were designed following Krueger (2014). In an opening question and three focus questions, we asked about the previous experiences of the TEs, secondly about results and findings, thirdly about perceived risks, and fourthly about chances of VR for intercultural media-related competence development. The focus group was mainly aimed at answering the 1st research question about perceived opportunities and risks. However, utterances could be classified as performance of intercultural media-related competence and thus serve to answer research question 2.

This type of data collection was chosen to capture perceptions of the TE immediately at the end of the exposure in VR with high interactivity between participants (Acocella 2012), which in turn fits well with a learning community-based understanding of PD for HE faculty (Hakkola et al. 2021; Foulger et al. 2017). All data were analyzed by qualitative content analysis (Mayring & Fenzl 2019) using MAXQDA software.

We proceeded deductively and developed a category manual from three frameworks. Perceived chances and risks of immersive features and corresponding perceptions were analysed against the background of the Behave-Fit Framework by Wienrich et al. (2021) which models five immersive features, i.e. “representation of others”, “representation of self”, “context representation”, “virtual objects”, and “immersion” of Social VR as well as corresponding perceptions of users. Furthermore, chances and risks with regard to the learning process were analysed with The 5-Stage Framework by Salmon et al. (2010)

To answer research question 2 to what extent IC aspects were addressed, we referred to the Reference Framework for Competences for Democratic Culture (Barrett et al. 2018b), as mentioned in the literature review, and included the categories “valuing cultural diversity”, “openness to cultural otherness”, “respect”, “tolerance of ambiguity”, “Skills of listening and observing”, “empathy”, “flexibility and adaptability”, “linguistic, communicative and plurilingual skills”, “co-operation skills”, “conflict resolution skills”, “knowledge and critical understanding of the self”, “Knowledge and critical understanding of language and communication”, and “Knowledge and critical understanding of culture, cultures, religions” as well as all corresponding descriptors as defined by Barrett et al. (ibid.) into our coding manual.

Two qualified researchers coded the material independently. The ratings were then compared one by one and a final version was agreed upon. In the data material studied, 468 codes were identified, of which 177 utterances occurred in the presurveys. 97 of these articulations were made by members of the PG-OFD and 80 by persons of the PG-RP. In the postsurveys, a total of 234 codes were identified, of which 110 occurred within PG-OFD and 124 in PG-RP. Of the total of 57 responses coded in the focus group interview, 23 were attributed to the PG-OFD and 34 were made by members of the PG-RP.

Results

RQ1: 1. Immersive features and corresponding perceptions

Regarding RQ1, 161 utterances accounted for immersive features and corresponding perceptions (Wienrich et al. 2021). TEs' perspectives on immersive features and perceptions were predominantly focused on the subcategories of *Representation of Others* (59) and *Self-Representation* (39), while considerations of *Context Representation* (21), *Virtual Objects* (18), and *Immersion and Presence* (18) were less represented.

1.1 Representation of others

a) Pre-/Postsurvey

In the presurveys, several TEs emphasized location convenience, i.e., “*coming together from different places when a direct meeting is difficult to realize due to distance*” (PG-OFD-2¹) as particularly conducive to “*encounters and learning between people of different backgrounds, cultural affiliations, and first languages [...]*” (ibid). Most TEs linked this to interactive capabilities between learners. However, stances varied between the assessment that “*the interaction becomes more real*” (PG-RP-2) and that *empathy* can develop between learners (cf. PG-OFD-3) to the perception that interaction “*must inevitably remain fragmentary and then runs the risk of becoming placative and narrow*” (PG-OFD-1). One TE argued that “*avatars can enable [learners] to enter into a communication without typical stereotypes*” (PG-RP-3). In the postsurveys, considerations of location convenience evolved into observations of social presence: “*The feeling of working together increases [...], I could notice that in comparison to ZOOM meetings*” (PG-OFD-5). The exchange was perceived as more informal than, for example, in ZOOM (cf. PG-RP-2). About half of the TEs concluded in the postsurveys that learning in an SVRE can also afford “*more equality*” (PG-RP-4) as well as “*experience of closeness and distance, which is culturally shaped*” (PG-RP-3) and either prevent “*stereotyping based on visual characteristics*” (ibid.) or “*deliberately provoke [such stereotypes]*” (ibid.) in order to facilitate intercultural learning.

b) Focus group

Only 4 articulations in the focus group also show a shift towards social presence. This included observations related to “*small playful moments [between learners] that are somehow more social*” (PG-RP-4). Likewise, an utterance

¹ All direct quotes were translated by the authors.

referred to the possibility of either preventing or consciously evoking cultural stereotyping by means of representation of others (cf. PG-RP-3).

1.2 Self-representation

a) Pre-/Postsurvey

In the presurveys, utterances coded in this category referred equally to “possibilities of bodily experience” (PG-OFD-1), “possibility of [facilitating] experiential learning” (PG-RP-1), and “almost limitless opportunities of initiating perspective shifts [through] manipulation of [the avatar’s] skin color, size, gender, abilities, etc.” (PG-RP-4). Utterances coded in postsurveys emphasized perspective-taking: *“Individualizing avatars allows for greater identification with other characters and thus promotes empathy with the interests and positions of different groups of people.”* (PG-OFD-4). Affordances for interculturally focused role-playing are emphasized:

“In the respective role, you are more than just dressed up, you play a character, you can move as that character, etc. The appearance no longer resembles the real self (unlike props in real-life role-playing). In this way, roles can be tried out in a playful way and the behavior and feelings in the respective role can be reflected upon afterwards” (PG-RP-2).

b) Focus group

Results showed that TE’s perceptions diverge, however, as to whether it was possible to facilitate shifts in perspective during the PD workshop: Some TEs *“noticed during the role play that these reductions to stylized avatars were somehow a help [...] in that you can perhaps [...] assume a role more quickly by changing the avatar* (PG-RP-4). TEs who reflected that they *“didn’t perceive at all that [they] somehow embodied this particular character somehow”* (PG-RP-3) also reasoned that as they *“[had] never seen [their] avatar themselves, no identification with that at all, no idea of what [they] actually embodied or represented”* (PG-RP-2).

1.3 Context representation

a) Pre-/Postsurvey

In the presurveys, about half of the TEs attributed to VR the potential to enable learners to experience “areas that lie beyond the borders of one’s own country” (PG-OFD-4), with several statements arguing with authenticity (PG-OFD-5). Individual statements also refer to VR as a “protected space” (PG-RP-2) in which intercultural exploration can also refer to historical perspectives (PG-OFD-5). A decrease in utterances (n=4) related to context representation can be observed in the postsurveys. Although less represented in the TE’s considerations, utterances coded in this category refer to location independence as an advantage (PG-RP-1) as well as the chance to “visit places that cannot otherwise be visited” (PG-OFD-1).

b) Focus group

The results show that context representation was not addressed.

1.4 Virtual Objects

a) Pre-/Postsurvey

In the presurveys, there are 9 statements referring to digital objects, albeit unrelated to intercultural learning. Also, in the 8 utterances in the postsurveys only one consideration is interculturally focused: *“The self-directed use of artifacts can help make cultural ideas visible”* (PG-RP-3).

b) Focus group

In the focus group, one TE reflected that they *“expected to be much more active”* (PG-RP-2). Although the context of the utterance suggests that PG-RP-2 refers primarily to movement within physical space, object manipulation cannot be excluded per se.

1.5 Immersion and presence

a) Pre-/Postsurvey

In the presurveys, immersion or presence was understood as *"immersion in a target culture"* (PG-OFD-4). Several references to presence as *"making situations experienceable"* (PG-RP-1) were found in the postsurveys. Individual TEs pointed to the attention-enhancing (cf. PG-RP-4) resp. disruptive potential of presence experiences in VR at both time points of the surveys:

"Instead of pure knowledge gain, this allows for the shattering of the experience, which can lead to a changed worldview and thus a new understanding of situations" (PG-RP-3).

b) Focus group

The results show that utterances related to context representation were not made.

RQ1: 2. Enabling Learning in a SVRE

a) Pre-/Postsurvey

About one third of the utterances coded using Salmon et al.'s (2010) stage model were found to fit into the first stage access and motivation. In the presurveys, several participants articulated high costs and lack of resources or high effort as possible risks (e.g., PG-OFD-2; PG-OFD-1; PG-RP-1), while in the postsurveys and focus group, technical difficulties and the resulting delays and disruptions were emphasized much more strongly. Results of the postsurveys show that some TEs themselves had technical difficulties and noticed that *"[...] the focus for [them] was actually on something else than interculturality [...] but that actually the technical aspect had a much greater importance"* (PG-OFD-2). Even though the majority of the TEs were not affected by technical difficulties, they were nevertheless concerned by the resulting delays: *"The workshop [...] was unfortunately relatively limited in content due to the time constraints from the outset and relatively long technical problems and their resolution"* (PG-OFD-4). Observations also show an emotional-motivational impact on the TE due to the technical difficulties: *"All were very open-minded, but also annoyed when the technology did not work effectively"* (PG-OFD-3). The second phase according to Salmon (2010), "online socialization", after which learners have developed a coherent virtual identity, was hardly represented in the codes of the presurveys. In the postsurveys, reflections that were coded within "online socialization", were identified more often among TEs from the role-playing group. Reflections of the TE refer to the assessment that *"the exposure time in the embodied avatar [would have to be] longer. The teachers have to deal with the embodiment and it also has to be in context with the seminar topic"* (PG-RP-4). Specifically, under role-play conditions, the participants' own online socialization was felt to be so complex *"that I didn't know very clearly how I was [going] into the role and how I was [going] out of it as well. I think that would have helped me in that role-play situation, to know how I relate and when?"* (PG-RP-2). Regarding the "knowledge building phase" according to Salmon et al. (2010), very few utterances were identified in the presurveys. In the postsurveys, it was noticeable in the knowledge building category that several TEs commented that "the term "intercultural" [...] remained elusive" (PG-RP-1) to them and that more emphasized input on the concept of culture" (PG-RP-3) would have been helpful. No utterances in the presurveys were coded for within the final phase of Salmon et al.'s (2010) framework within the presurveys. It cannot be deduced from the postsurvey data that the TEs involved locate their own learning process within the development phases according to Salmon et al. (2010). TE also saw *"great potential in areas such as classroom management and role play"* (PG-RP-2, own translation). The resumes of the remaining TE show uncertainties (*"All in all, I now have a first insight into VR, but I do not yet know exactly how I can use it in my subject"*, PG-OFD-5) or a critical attitude (*"I do not see Social VR as an opportunity, in my opinion the obstacles outweigh possible advantages that are not really apparent to me"*, PG-OFD-4) regarding its use in their own teaching.

b) Focus group

Several TEs verbalized potentials after the workshop: *"It would probably have been exciting to dive into that more closely. And I looked at what was on that paper. What would have been planned, that would have certainly led to different results"* (PG-OFD-1). The SVRE was assessed *"as a wonderful basis in order to be able to develop a dialogue based on it, which of course is primarily intercultural, i.e. bridging distances, and not necessarily intended for people at the same institution"* (F2, own translation).

Addressing Intercultural competence

Regarding RQ2, the analysis of utterances in the pre-/postsurvey (cf. Figure 2) showed most pronounced differences of frequency before and after the workshop related to the competencies "tolerance of ambiguity" in the domain

"attitudes" as well as in the domain "knowledge and critical understanding". Findings regarding "language and communication" as well as "culture, cultures and religions", the pre-post comparison show that TE's utterances could be attributed to these competencies in the postsurvey both more often and at an overall higher level. The results for the competencies "Empathy" and "Flexibility" do not show a higher frequency in the pre-post comparison, but it can be seen that a part of the utterances can be attributed to a higher competency levels after the workshop than before.

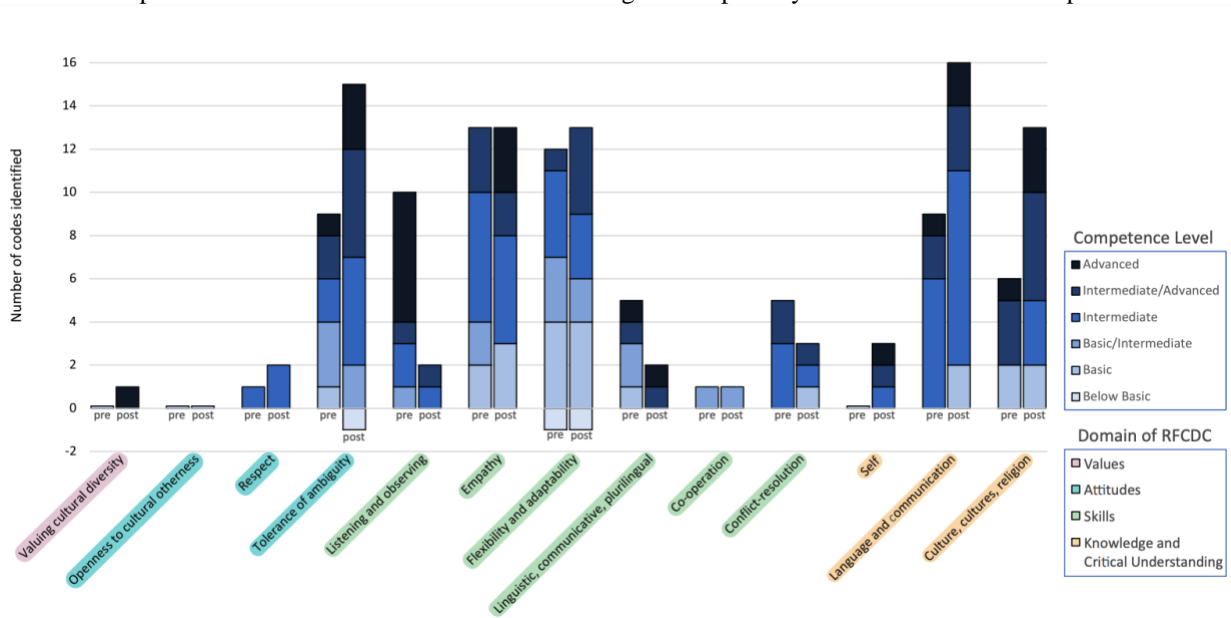


Figure 2: Frequency of utterances that can be attributed to IC before and after the workshop. Data source: pre- & postsurveys.

In the pre-post comparison, stagnation or declines in the frequency and level of the utterances attributed to the respective competency can be observed for the three competencies in the domain "skills". Slight quantitative and proficiency-related differences are shown for the other three competencies. A decline of utterances is noticeable in the pre-post results attributed to observational skills. While in the pre-survey 6 out of 10 utterances corresponded to the descriptors in the advanced level, in the postsurvey and focus group only 2 statements were consistent with the descriptors of this competence. Only a minor extent of utterances could be attributed to the competencies "valuing cultural diversity" (values), "respect" (attitudes), "knowledge and critical understanding of the self" as well as "communicative", "cooperation" as well as "conflict resolution skills". Results of the pre-/postsurvey analysis (cf. Figure 2) as well as the focus group (cf. Figure 3) revealed that no utterances could be related to the competency "openness to cultural otherness" in the domain of attitudes. Overall, the focus group results are consistent with the results of the pre-/postsurvey. But here results show that statements of TEs could be attributed to ambiguity tolerance immediately after the immersive experience and in an ad hoc manner.

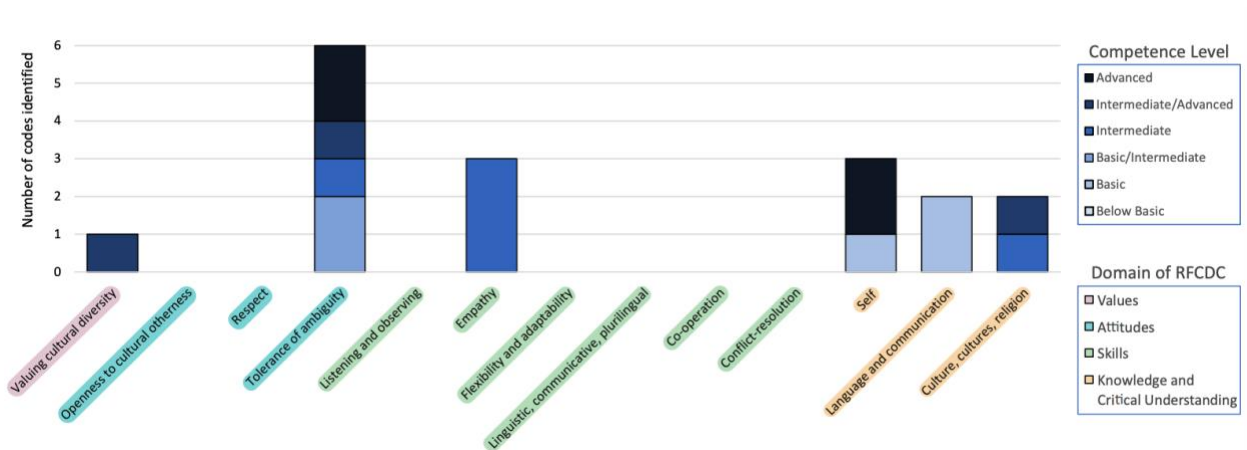


Figure 3: Frequency of utterances that can be attributed to IC after the workshop. Data source: focus group transcript.

Limitations

With regard to limitations of this study, it involved a small convenience sample. Thus, we do not aim for generalizability, but strive for transferability of our results in terms of the quality criteria of DBR (Tulodziecki et al. 2013; McKenney & Reeves 2018). From a theoretical perspective, the integrability of the 13 selected competencies of the RFCDC (Barrett et al. 2018a) into TETC 8a (Foulger et al. 2017) should be subject to interrogation in further research. Due to the limited possibilities for designing a comparison group and the lack of suitable competency measurements, the results remain exploratory, but are beneficial for the further development of the design-based research process.

Discussion and Outlook

With respect to RQ 1, i.e., perceived risks and benefits, the results of this study show that the PD workshop was appropriate to enable TEs to weigh the immersive features of social VR along the criteria of Wienrich et al. (2021). Most importantly, the potential of SVREs to create social presence as a significant enabling factor for empathy building (cf. *ibid.*) was recognized as an opportunity. It has also been observed that especially complex design tasks according to the action- and development-oriented approach (Tulodziecki et al. 2021) in social VR offer good opportunities for experiential intercultural learning (Hiller & Vogler-Lipp 2010) in relation to the representation of the self (Wienrich et al. 2021) through the possibility of perspective-taking (Bosse 2010; Leenen & Scheitza 2019). Recent studies on the use of SVREs for intercultural learning by preservice teachers suggest potentials of virtual objects than reflected in our results (Hein et al. 2021; Förster et al. 2021). Thus, one aspect for a redesign of the pedagogical concept for a follow-up study would be to emphasize the meaningful use of virtual objects in the design of complex tasks (Tulodziecki et al. 2021). Regarding the perceived risks and benefits related to the learning process as modelled by Salmon et al. (2010), the results of this study show that the learning process with an immersive medium require the prevention of technical difficulties and time to guide the participating TEs through the initial phases. This need can be further supported by findings from recent meta studies on the use of VR in HE (Hamilton et al. 2021; Radianti et al. 2020; Huang et al. 2021) However, these time-related requirements pose a complex practice problem in the context of PD of teachers in HE, with little to no resources and recognition allocated for this in many national and institutional contexts (Biesta et al. 2022). Regarding the question to what extent utterances could be attributed to IC, it is noteworthy that values and attitudes such as "openness" and "respect" (Barrett et al. 2018b) were hardly addressed explicitly. Even though changes of values and attitudes can only be expected over a longer learning period, pedagogical concepts within a limited time frame could encourage TE to reflect on the corresponding values and attitudes. Similar conclusions can be drawn to reflect on "Critical Understanding of the Self" (*ibid.*), which was particularly addressed by the immersive intercultural facilitated dialogue and role-play approaches. At the same time, however, an increase of utterances which could be attributed to IC of TEs, was shown, e.g. concerning "tolerance of ambiguity" and "empathy" (*ibid.*).

In future research, it seems important to further explore, how different aspects of IC can be addressed in PD and how TE's perceive immersive features of SVR. Furthermore, the potential of immersive intercultural facilitated dialogue and role-play approaches to foster IC competency development of TEs in social Virtual Reality environments should be addressed.

Acknowledgements

This research has been funded by the Federal Ministry of Education and Research (BMBF): Funding for teacher training with a focus on digitalization in teacher training in the project CoTeach (project number 01JA2020).

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