TEACHERS' VIEW ON THE POSSIBILITY OF DIGITAL AVATARS TECHNOLOGY USE IN PRESENT REAL-LIFE CLASSROOMS

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Abstract

The Covid-19 pandemic and digital transformation of schools have significantly impacted education in Croatia and globally. Resourceful teachers did not hesitate to implement new technologies using every available resource in their classes.

An avatar is a manifestation of the human inhabiting and controlling it, but its constraints determine the range of desired behaviors. The Tablet-Human Hybrid Model of Avatars is developed for use in real-life classrooms, enabling the inclusion of absent pupils.

The Focus group method is applied to discuss applicability, constraints, and methods of using digital avatars in present real-life classrooms. A group of teachers has been gathered for this purpose. All teachers included in the focus group were employed in a teacher's workplace in primary or secondary schools at the discussion time.

The paper explores how using digital avatars can improve the teaching process in real-life classrooms from the teachers' point of view and will display gathered information on the discussed subject.

Keywords: avatar, focus group, real-life classroom

Introduction

The covid-19 pandemic had a substantial influence on education globally. In the Republic of Croatia, classes were held face-to-face, online, or in combination, depending on the current health situation. Depending on the situation, the population was obligated to quarantine from 7 to 14 days for contact with the infected.

Before the Covid-19 pandemic, in the Republic of Croatia, the Ministry of Science and Education, with the Croatian Academic and Research Network (CARNET), distributed preinstalled tablet computers to pupils starting in 2020. The digital transformation of the schools undoubtedly contributed to easier coping and functioning during classes during the Covid-19 pandemic (Ministry of Science and Education Croatia, 2019). Tablets were distributed to all fifth and seventh-grade primary school pupils for two consecutive school years, ultimately supplying all fifth to eighth primary

school pupils. Primary schools for lower-grade pupils received a certain number of tablets, but not all, while high schools received tablets only for poor pupils (Ministry of Science and Education Croatia, 2020).

Some teachers did not hesitate to implement avatars in their classes using tablets during the Covid-19 pandemic, although without scientific knowledge of physical avatars.

Theoretical background

A positive correlation between class attendance and academic performance and learning outcomes is confirmed in several studies (Burns & Ludlow, 2005; Stanca, 2006; Kassarnig et al., 2017; Tetteh, 2018). Duka, Duka, and Kolar-Begović (2022) seclude effects on absentee pupils from Malcolm et al. (2003) list that refers to absence due to illness or Covid-19 quarantine: academic underachievement, difficulty making friends, and loss of confidence and self-esteem, and secluding from effects on other pupils using the same criteria: friends and partners were deserted, and disruption in class when absentees returned.

Organizational changes and restrictions caused by the pandemic had the most negative impact on motivation to learn. At the same time, most students rated their impact on developing digital skills as positive (Ristić Dedić & Jokić, 2021).

A human surrogate is any object, virtual, physical, or even a blend of virtual and physical, that acts as a stand-in for a human. The avatar's specific manifestation may constrain how it carries out some of these desired behaviors (Hughes, 2014). The word *avatar* derives from Sanskrit and refers to the incarnation of the Hindu that embodies a spiritual being in animal, human or hybrid form to interact with humans (Parrinder, 1997; Lochtefeld, 2002). Lucasfilm's Habitat game first used an avatar in 1986 (Morningstar & Farmer, 1991). Word avatar was popularized in the science fiction novel *Snow Crash* (Stephenson, 1992). The term and concept appeared in 1984 in online multiuser dungeons (often abbreviated as MUDs), and the concept arose in works of fiction dating back to the mid-1970s (Bailenson & Blascovich, 2004). Gerhard et al. (2004) did extensive literature research on the characterization of avatars in which they refer to avatars as: "a user embodiment in a collaborative virtual environment" (Gerhart & Moore, 1998); "the avatar as a bodily presence in virtual space provides a focus for conversation and social interaction" (Slater at al., 2000) and, "through avatars, users embody themselves and make real their engagement with a virtual world" (Taylor, 2002). In a collaborative virtual environment, the avatar can be under the direct control of a user, or the user can define goals and instructs an *agent* to control the avatar (Gerhard et al., 2004).

Duka, Duka, and Kolar-Begović (2022) assert that defining an avatar as an exclusively virtual space construct moves farther away from its original meaning and constrains its applicability. The same authors did extensive literature research suggesting

that the James Cameron science fiction movie *Avatar* from 2009 introduced an example of a perfect avatar. They also cite that "the two-way telepresence robot system used in Okamura and Tanaka's (2016) research works on the same principle but with significant limitations compared to the movie Avatar", noticing that the authors did not use the term avatar in their paper.

Guizzo (2010) used the term *real avatars* for telepresence robots*.* Seet et al. (2012) present the design for the mobile robotic avatar MAVEN (Mobile Avatar for Virtual Engagement by NTU). Misawa and Rekimoto (2015a, 2015b) explore telepresence, embodying physically and socially, using human surrogates. Authors developed a prototype system called *ChameleonMask,* where the remote user provides directions that the surrogate enacts with his or her body (Duka, Duka, and Kolar-Begović, 2022).

Tablet-Human Hybrid Model of Avatars in real-life classrooms

Duka, Duka, & Kolar-Begović (2022) presented the new Tablet-Human Hybrid Model of Avatars using tablets and physical agents.

The model works by pairing Tablet A (using video calls/chat/conference software), in possession of the absent pupil (*Inhabitor*), and Tablet B, owned by the pupil present in the classroom (*Physical agent*), shown in Figure 1. Tablet B, this way, becomes *Avatar.* In the model, the physical agent is a classmate who executes requests for moving and directing the tablet the inhabitor vocally asks for.
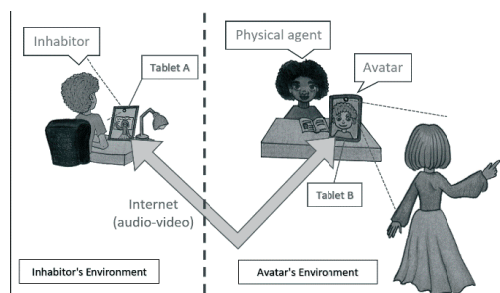

Figure 1 Tablet-Human Hybrid Model of Avatar

Illustrations courtesy of Marina Duka

Figure 2 Using avatars in a real-life classroom

Figure 2 illustrates the model of inclusion of absent pupils in a real-life classroom in the form of avatars.

The Tablet-Human Hybrid Model of Avatars enables class attendance for pupils otherwise prevented from it, such as long-term absentees due to forced isolations, prolonged illnesses, or hospitalizations.

The model's functionality test, conducted during the school year 2021/2022 and elaborated in proto-research, was presented to the Focus group. Absentees (inhabitors) were instructed to place the tablets on the desk to have their hands free to work
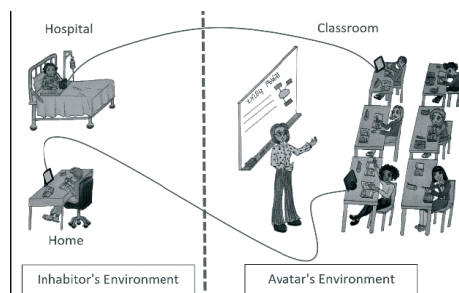
and see the tablet screen well. Consequently, they filmed their upper body and the work surface of the table as projected on the avatar. They conveyed their gesticulation in interactions, not just facial expressions (Duka, Duka, & Kolar-Begović, 2022).

Research Methodology

The research goal was to collect qualitative data on teachers' views on the possibility of using digital avatar technology in present real-life classrooms, on the example of the Tablet-Human Hybrid Model of Avatars, as a means for its further development. This research is based on the following two hypotheses:

H1: Avatar technology in real-life classrooms reduces absentee pupils' social isolation.

H2: Avatar technology in real-life classrooms mitigates the absentee pupils' academic underachievement.

This research is conducted deductively, starting from the hypotheses mentioned above. The focus group method is the primary method to achieve the research goal. This qualitative research technique combines the advanced form of a group interview with participating observation (Vinković, 2021). Collected data have been analyzed using the qualitative approach for studying subjects (Halmi, 2004) and will be used to develop a questionnaire for further examination.

An occasional group of twelve primary and high school teachers was selected. The applied criteria were proximity and availability of respondents. The interview was performed online using video conference via *Zoom Cloud Meetings*, and there are several reasons for it. Reduction of travel and accommodation costs for participants and more accessible organization of research implementation time. Also, the platform was a simple means of recording video and audio material, facilitating the subsequent transcription of the obtained data. During the group interview, all participants had the video camera on and left additional comments in the group chat. Respondents have been informed of the problem and the study's goal. Some descriptive data are presented in Table 1, using pseudonyms codes to preserve respondents' anonymity. Teachers were informed about the Tablet-Human Hybrid Model of Avatar developed by Duka, Duka, & Kolar-Begović (2022) and testing experiences collected through pro-to-research results.

During the group interview, the following research questions were asked:
1. Is the presented model applicable in their classroom?
2. Is the presented model applicable to all subjects?
3. What is the maximum number of avatars in the classroom that do not disturb the teaching process?
4. What are alternatives to tablets in both: the inhabitor's and the avatar's environment?

Table 1 Focus group - descriptive data

Code	Work experience	School				Working as	Class size/s
		Primary	Secondary	Rural	Urban		
U1	23	+	+	+	+	Math and computer science teacher	8-17
U2	16	+		+		Class teacher	5
U3	24.5		+		+	Math teacher	22-27
U4	12	+		+		Class teacher	15
U5	17	+			+	Principal	
U6	11	+			+	Principal	
U7	12	+		+		Class teacher	4
U8	7	+		+		Class teacher	13
U9	10	+		+		Math teacher	10-15
U10	15	+			+	History teacher	17-27
U11	24	+			+	Croatian language teacher	17-22
U12	25	+			+	Physics teacher	20-28

Results and discussion

It has been gathered around 80 minutes of the interview video recording.

Through the interview, respondents asked more detailed questions about model functionality testing experiences in proto-research that the authors took during the school year 2021/2022 (Duka, Duka, & Kolar-Begović, 2022).

Thematic analysis of the collected material is presented and discussed in three identified main themes listed from the A to C subchapters.

Improvement of absentee pupils' social status

All the respondents agreed that the Tablet-Human Hybrid Model of Avatar would improve the social status of absent pupils. Not all of them agree on the necessity of enhancing the already well-established online teaching model, as much as they see the opportunity to implement this model to improve social contact between the absentee and classmates in times of one's isolation or otherwise caused long-term school absences. Respondent U3 says: "This model would improve social contact between pupils, while it would not significantly influence the quality of the teaching process in high school where children are well prepared for online classes, as they are more serious and responsible than primary school pupils. Although I think teaching practices do not need repairs, I find this a great idea to explore to mitigate adverse effects on

social isolation of long-term absentees". U4 thinks that the inclusion of a pupil absent from classes in any way is better than none or just sending him/her prepared materials. U4 and U9 find it an entirely feasible idea instead of a video recording of classes, a much better one because it has critical feedback engagement of pupils during classes. U5 sees benefits in the context of the increased positive attitudes of pupils toward inclusion, helping others, teamwork, etc. U6 sees it as a possibility to include long-term absentees, such as students with limb fractures and other traumas: "Not only is it a great idea, but maybe it is the only model for inclusion of these pupils to classes available now." This respondent also says: "The matter of pupils' activity - asking questions, attendance, and socialization during class break, I see it as a great advantage of this model."

Tartavulea et al.(2020) confirmed that students might experience isolation feelings, which impacts their confidence level in online learning (de Metz & Bezuidenhout, 2018) and interfere with their sense of belongingness. Their sense of isolation may also affect how much they are likely to participate and genuinely engage in classic online learning. The observations of the focus group on this theme refer to the mitigation of previously mentioned adverse social effects and those social effects on absentees listed by Malcolm et al. (2003), such as difficulty making friends and loss of confidence and self-esteem. According to this group of respondents, *H1: Avatar technology in real-life classrooms reduces absentee pupils' social isolation*, is confirmed, and aligns with the theoretical background.

A. Technological capabilities and obstacles

Respondents agree that this model applies to fifth to eighth-grade primary school pupils because the State has fully provided school tablets. School tablets were distributed differently for first to fourth primary school graders and high school pupils. The first technical obstacle they see for mentioned pupils is possessing the right technology for implementing this model (tablet, mobile phone, or PC). "Some of my pupils are poor, their parents do not possess adequate appliances to start with, and first to fourth-grade pupils did not get the appropriate amount of school tablets for all of them", says U4, and U2 agrees on that. U7 wanted to know the ideal technical conditions to execute this model. Most respondents agreed that school tablets are adequate for the model's implementation but that many technical problems must be addressed to fulfill the model's designed functioning. U10 sees the model as an exciting idea with more pros than cons.

Regarding technical issues that should be addressed, the respondent says that specific software that prevents pupils from recording classes must be installed to avoid possible abuse of the model. U12 thinks the quality of current tablet cameras and their features, such as zoom-in and zoom-out, should be improved. U5 has very concrete instructions on the technical issues that need to be dealt with first: "Improvement of camera/volume/sound quality, teacher feedback technology (technical solution for

its speeding-up and alleviation), same principles for pupils' feedback, sharing presentations, etc." All respondents agree that optimal and maximum numbers of avatars should be empirically tested. The theoretical maximum number of avatars in the presented model could exceed half of the class size. The Focus group concluded that one to three avatars per class are optimum, depending on the class size, while more than four or five are too much. U2 finds performing musical classes via this model only possible for the listening part of the subject, not singing. As an obstacle to this model, the same respondent sees pupils' misbehavior and fights, which could destroy avatar tablets among younger children. To understand better the technical side of the model, respondents frequently ask questions on how it was dealt with in earlier mentioned proto-research. Once they get a broader picture, they have all agreed that it is not completely clear that this model with these technical possibilities would significantly improve teaching quality. Once the problems are addressed, the model efficiency should be tested and measured. If it is proven efficient enough, U5 and U6 are ready to implement it in their schools, agreeing with the theoretical findings that interactive collaboration should increase students' engagement (Shi, 2019; Tartavulea et al., 2020).

Most of the respondents agree that dealing with technical problems, not only by the teachers but also by the pupils, would lead to lower class efficiency, which indicates that educators have a professional and social responsibility to be digitally literate (Widana, 2020; Udeogalanya, 2022) and should match the increase in the development of digital skills of pupils observed by Ristić Dedić and Jokić (2021). U10 is afraid that pupils would focus on the avatar's direction instead of the class. The classmate representing the physical agent would do nothing else but take care of the avatar. On the other hand, U6 sees the role of a physical agent as an opportunity to assign pupils with ADHD and similar difficulties which already need additional tasks to redirect unwanted behaviors. U4 has an autistic pupil in her class who considers tablets as toys and sees prolonged time to adjust to a new idea of a tablet being another pupil in the form of an avatar as an obstacle but finds it doable and manageable. For the rest of the respondent's 2nd grade, the respondent thinks the model would be adopted in a few days. Some respondents noticed the negative side of the parents' class presence via an avatar. "I see the possibility of parents' intrusion in the classroom as a possible risk because I have had a few very inappropriate situations during online classes.", stated U7, who agrees with the clarity and applicability of the concept only if teachers are ready to learn and adapt. U5 and U10 see classroom situations as intimate and think that teachers would need some time to accept the idea of someone "outside" having the possibility to intrude on their classes.

The observations of the Focus group on academic underachievement due to technological imperfection and too many obstacles in a current technical solution oppose Stanca's (2006) finding that missing one lecture was associated with about a half percentage point drop in test scores. This Focus group does not give enough evidence to confirm the second hypothesis *H2: Avatar technology in real-life classrooms mitigates the absentee pupils' academic underachievement.*

But also, the focus group agrees that the alternative to using the model is keeping practice unchanged, which leads to an unsupported absentee or overburdened teacher.

B. Ideas and visions of/for the future

Tablet-Human Hybrid Model of Avatars in real-life classrooms is considered a great idea, applicable in the present situation, and great material to develop in the future by all the respondents. Once the technical obstacles were resolved with the presented model, some respondents dared to go even further in their projection. U8 explains that it is easy to imagine it as a holographic avatar model soon. U6 states that once tested, the model should be technically enhanced. The special classroom should be prepared with the necessary technological equipment for the model to work without any difficulty. To go further, U6 and U5 see it as a possible future project that the EU Funds could easily fund and, if such a model is developed, are ready to test the model in their schools. Even though it is an excellent idea, respondents are reluctant to state that every teacher would welcome the new change in their practices after such massive changes they had to make due to the Covid-19 pandemic. U10 says that some teachers would not want outsiders, such as parents, always to have access to their classes. Most have specific and not always pedagogical methods for maintaining order in their classrooms which are efficient and would not be approved by the "outsiders." U5 thinks such a problem is easily avoided by adding a special appendix to the work contract relating to teaching in these conditions. Most believe that implementing this model by force would lead to a mutiny among teachers, but all of them agree that if the State wants it and encloses scientifically based proof, they will have to accept it.

Significant questions unrelated to thematic analysis

During the interview, questions about the legality of the model arose. U8 was worried about legal regulations and asked: "Does GDPR regulate this? Consent – what would it look like? Even the school principal cannot intrude on the classes unannounced, but in this case, the parent evidently can participate in class and listen to teachings."

This problem, detected by the focus group, is regulated by the Law on the Implementation of the General Regulation on Data Protection (NN 42/2018) passed in the Croatian Parliament, aligned with Regulation (EU) 2016/679 of the European Parliament and the Council on the protection of natural persons concerning the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Croatian schools use the Application of the General Regulation on Data Protection in Schools, published by the Croatian Personal Data Protection Agency (AZOP, 2022), as their guiding document. Respondents agree that probable legislative regulation is grounded in GDPR, but they are unsure about it. All agree that this model should be regulated in the same way as the online teaching model was during the Covid-19 pandemic.

All respondents also agree that, before implementation, appropriate Etiquette should be developed.

Conclusion

The main research goal of gathering qualitative data for further investigation on the article subject has been achieved.

Hypothesis *H1: Avatar technology in real-life classrooms reduces absentee pupils' social isolation,* expected considering theoretical data, and was accepted by this focus group.

Initially set hypothesis*, H2: Avatar technology in real-life classrooms mitigates the absentee pupils' academic underachievement,* was rejected due to many perceived obstacles and technical imperfections of the current equipment. Even though it was unexpected, it proved the value of the focus group method in gathering initial data for further quantitative studies on the problem. Besides testing hypotheses, the focus group method provided many valuable data. Although results cannot be generalized outside this group of respondents, they indicate the quality and value of the presented model. All respondents agree that it is the idea that should be further tested and is fruitful for future studies.

This research has opened new questions and provided enough data to encourage broader and more severe studies on the model within the school system. The next step is to mitigate technical imperfections and expand the model's functionality, using empirical research as a base for quantitative analyses. The school system needs to monitor technological progress, to anticipate and develop new teaching methods in line with progress. Such changes need to be planned and created now and not wait for the next world crisis that forces us to ad hoc, untested and forced solutions.

The focus group was an appropriate method to give guidance for upgrading the existing model, yet the method was not adequate for the general conclusion.

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