Back to 80`s – a case study of how an 8-bit pixel art virtual world enhances the social components of remote teaching

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Abstract - **Numerous tectonic shifts have occurred during the last few years in numerous spheres of life. Working from home and teaching in a remote environment has become the new normal for many educators, and while many have adapted to their home workspaces and Zoom sessions, the situation is becoming tiresome for all parties involved. It acts as a virtual reminder of the internet's inability to facilitate the in-person connections that people need. Traditional video meetings and conferences are transformed by the new technology into something that more closely resembles in-person conversations. The authors will demonstrate an example and a method for increasing student participation and creating a more engaging environment through the use of a free virtual world application while boosting the social components of an online event. Gather Town will be introduced, and its ability to bridge gaps between in-person and virtual socialization will be demonstrated. Individuals can now inhabit a universe that is not just inclusive, but also interactive, in ways that Zoom and other platforms are not. The findings of a study comparing the levels of involvement across multiple web-conferencing tools and this one will be presented, as well as an experience report.**

Keywords - remote teaching environment; video call; engagement; social component; Gather Town

I. INTRODUCTION

To halt the spread of COVID-19, national education ministries are implementing and will continue to create strategies to ensure that students continue to receive education through other channels in the face of widespread school closures. Simultaneously, with the "new normal" situation, both small and large businesses were instructed to encourage employees to work from home whenever the nature of the job permitted and were required to schedule online meetings with audio and video so that people inside and outside the company could participate from anywhere. Educators were and continue to be required to create and manage distance learning activities using videoconferencing capabilities in addition to learning management systems. Popular video chat systems are widely used to interact with colleagues, family, and friends, for work and play, professional development, and recreation. As a result of the recent explosion in videoconferencing, communication has improved significantly. Research [1] has been conducted on the psychological effects of spending hours each day on these platforms. Just as "Googling" has become synonymous with any web search, the phrase "Zooming" has grown ubiquitous, serving as a generic verb to replace the term "videoconferencing." While social distancing mechanisms have kept people physically separate, virtual encounters have exploded in popularity. Each day, hundreds of millions of events occur. According to the mentioned study, video chats exhaust humans for at least four key reasons and lead to the sensation widely referred to as "Zoom[1] fatigue." Author in [1] stressed that his goal was not to disparage any videoconferencing platform – he appreciates and frequently uses tools like Zoom – but to demonstrate how current implementations of videoconferencing technologies are exhausting and to suggest interface changes, many of which are straightforward. Additionally, he makes recommendations to consumers and companies on how to maximize the current capabilities of videoconferencing to reduce weariness. Additionally, readers are requested to engage in a research study to establish a Zoom Exhaustion & Fatigue Scale (ZEF). It assists in determining how much fatigue individuals experience in the workplace as a result of videoconferencing. The scale is a 15-item questionnaire that is freely available and has been evaluated with over 500 individuals in five distinct studies over the year 2020. It elicits information regarding a person's overall exhaustion, physical exhaustion, social exhaustion, emotional exhaustion, and motivational exhaustion.

II. ONLINE TEACHING ENVIRONMENT

Online education has its advantages and disadvantages. As for implementation advantages, online teaching emphasizes the possibility of accessing teaching from a spatially remote environment, such as a home, as well as the flexibility of accessing teaching (users can access recorded lectures according to their abilities and obligations) and the greater availability of teaching materials, which are mostly available in electronic form in this mode of teaching [2]. Additionally, it saves time and money on travel and other expenses, freeing up time for learning and other activities.

[1] ©Zoom Video Communications, Inc.

The most frequently mentioned disadvantages by participants in [3] are a lack of social connection, a lack of self-motivation, frequent technological difficulties, a lack of materials, and non-adherence to scheduled lectures. Student satisfaction research is critical in both traditional and online education. Student happiness is a critical component of the process of determining success factors in online education.

III. Videoconferencing and Synchronous Learning Environment

Videoconferencing is a synchronous mode of communication that enables the interactive transmission of speech, video, and data between two or more groups of people [4]. The synchronous paradigm facilitates real-time contact between teachers and students who are physically separated, avoiding the reduced degree of involvement and engagement associated with asynchronous communication.

Videoconferencing systems, according to distant education research [5], provide real-time interaction, permit quick feedback, promote learner-centered involvement, and create new potential for cooperation in distance education. As a result, videoconferencing can be an excellent tool for teaching and communication in synchronous distant education. Additionally, teachers and students can communicate with one another via audio, visual, and spoken communication, owing to the multimodal capabilities of web-based videoconferencing technology. This eliminates the uncertainty inherent in text-only communication and increases psychological engagement, which may result in collaborative work performing at a level comparable to face-to-face communication. Thus, adopting videoconferencing in distant education can help establish a learning environment that is more akin to a real classroom [6]. Likewise, authors in [7] assert that videoconferencing systems promote the design and installation of public and private spaces conducive to the formation of communities of practice in higher education, hence facilitating innovation and change management.

Videoconferencing systems offer the ability to improve the online learning and teaching experience from a social constructivism and sociocultural theory standpoint.

According to several studies presented in [8], online learning during the pandemic results in a lack of motivation to study, a high degree of stress, and a higher dropout rate. One of the reasons for this is that learning from home reduces social interaction in the classroom. According to previous studies, breaking students up into small groups for conversations can help them feel more socially engaged in online learning. This method is thought to increase student course satisfaction. Through small-group conversation, the purpose of study elaborated in [8] was to investigate the impact of social presence on student satisfaction. The study polled students who used the Zoom application's breakout room to participate in small group discussion in synchronous online learning. In this study, small group discussion in a synchronous online learning environment was found to be effective in facilitating social presence among students. Furthermore, social presence was linked to student happiness in three constructs: social sharing, open-mindedness, and social identity.

A study in [9] investigated a blended synchronous learning environment (BSLE). Most students attended the course face-to-face, while the others used two-way videoconferencing to participate (Zoom). The study's goal was to discover more about the students' learning experiences and how they felt about the blended synchronous learning technique. The study included twenty-four students participating in an optional course at a teacher education school. Students loved the flexibility and ease of attending lessons via Zoom from remote locations, according to the study's findings. According to the researchers, students' engagement in Zoom, on the other hand, was poor. When students were called upon, they would sometimes turn off their webcams and not respond. Furthermore, neither the researchers nor the students reported any serious technical difficulties when utilizing Zoom, and it appeared that all online students were able to easily attend the Zoom sessions. The researchers concluded that the main factors contributing to a successful BSLE experience are effective communication between online students and the instructor, followed by communication between online students and classroom students, online student engagement, instructional activity redesign, and audio quality.

IV. Gather Town

Gather Town is a web-conferencing application similar to others, but with the added benefit of visualizing the virtual "room" user and its colleagues are currently occupying, as well as the ability to move around and interact with other participants based on their physical locations in the room, just as it would be in real life. Detailed description can be found in [10].

Gather is entirely spatial—you must be virtually "near" to someone in order to hear them, which enables multiple talks in one place and fantastic spontaneous connections. This resembles happy hours and conferences, where huge groups of individuals split up to socialize in smaller groups. It is a two-dimensional map platform in which users control an avatar that moves through the space.

When your avatar encounters the avatar of another user, you are immediately invited to a voice or video conversation with that user.

As one avatar is coming into the “talking” distance of another or getting out of range, his camera rectangle is becoming slightly transparent until avatar walks away out of the range when rectangle, and possibility to talk with the person, vanishes completely as can be seen in Fig. 1.

Gather's main objective is to create the best Metaverse possible for humanity. Unaligned business models have a history of generating profit at the expense of the user's well-being. Society derives the greatest benefit from a Metaverse that operates on a free, open platform similar to the Internet.

Figure 1. Screenshot of Gather Town interface

The developer team of Gather has included a few pre-configured games in their Object Picker. These games are configured to allow participants to join private games hosted within the Gather space, allowing them to play while video chatting with others. A popular game of Tetris can be seen in Fig. 2. You can create your own environment, modify an existing one, and even incorporate interactive objects like as white boards, video games, banners, and websites.

Gather Town was chosen due to its numerous benefits. It provides a free version for users; is self-contained; may be utilized in an educational setting; incorporates gamification components (it is, after all, a game); and most importantly - nudges verbal communication.

The one disadvantage, at the moment, is that its full functionality is available only on non-mobile devices such as laptops or desktop computers.

V. Encouraging Social Skills

The need for belonging and respect is one of the requirements that contribute to student motivation. Students who are otherwise introverted and not the class's loudest members will have a more difficult time developing social skills through video conferencing with other students. Teachers use their approach and available chances to build and maintain a positive communication atmosphere among students and with the teacher during online teaching. However, it remains the most difficult aspect of online teaching to facilitate and encourage social skills among all pupils.

Taking this into account as well as the other research studies mentioned earlier and the fact that engagement and motivation in STEM subjects were great problem prior to this "new normal," it was necessary to develop a lesson to address these concerns.

A. *Interdisciplinary lesson*

The goal of developing an interdisciplinary lesson was to practice vectors and related mathematical concepts, become acquainted with the intangible cultural heritage of the region, and acquire facts about Croatian literacy. However, all of this had to be done in a remote educational setting. While remote teaching as a field adapts to the disruption generated by the COVID-19 epidemic and videoconferencing technologies enhance their functionality, it is critical to remember human agency throughout this shift. Humans behave and make choices in response to their experiences, reflections, self-determination, and motivation. Social constructivism states in [12] that learning occurs because of learners' interactions and experiences with others. Learning occurs within a complex social system, and people's learning and development are influenced by their participation in cultural activities. According to [4], videoconferencing expands the bounds of classrooms, merges the existence of virtual and physical classrooms, and overcomes the physical limitations of traditional classrooms. This promotes students' contact with their environment, peers, and instructor, and thus broadens their educational experience.

Considering all the research findings on video conferencing tools and "zoom fatigue," the authors chose Gather Town to determine whether the social interaction would be strong enough to captivate students in this particular lesson and sustain their interest throughout. This added an additional benefit: students gained an understanding of what it was like to play games in the 1980s.

B. *Gamification, Self-determination Theory and avatars*

The motivational effects of gamification are examined from an educational psychology perspective in [11]. While gamification is not effective in and of itself, different game design components can elicit a variety of different motivated responses. The effects of various configurations of game design features were investigated using a self-determination theory framework.

Self-determination Theory (SDT) is a motivational theory of personality, development, and social processes that investigates how social contexts and individual differences facilitate various types of motivation, particularly autonomous and controlled motivation, and thus predicts learning, performance, experience, and psychological health. According to SDT [12], all human beings have three fundamental psychological needs—those for competence, autonomy, and relatedness—that must be met in order to have successful functioning and wellbeing. Satisfaction of these fundamental requirements fosters the development of optimum motivational qualities, autonomous motivation, and intrinsic ambitions,

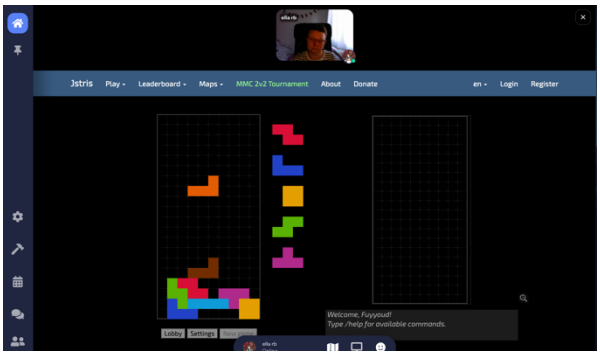

Figure 2. Screenshot of playing Gather's pre-configured game

all of which contribute to psychological well-being and successful engagement with the environment.

Badges, leaderboards, and performance graphs all influenced competence and autonomy in terms of work meaningfulness. According to this research, avatars, a meaningful narrative, and teammates all had a beneficial effect on social relatedness.

While exploring the castle, as little avatars, with names hoovering over their avatar-heads, the students are required to find several objects. Each discovered item contains a math problem and multiple-choice answers with accompanying clues. To receive the correct hint, they must complete a math problem and select the correct solution. The who-what-where worksheet should have all the solutions and clues. After ticking off "Who," "What," and "Where," only one clue remains in each column. The last Who, What, and Where is a factual story of a Croatian writer who resided in a particular region, and it also serves as the final solution.

The authors reasoned that the unique gamified elements of Gather-facilitated lessons may elicit motivational effects only if participants were aware of their existence. A meaningful story, for example, that is provided to provoke feelings of social connectedness, cannot fail since players are unable to skip important screens because they are incorporated into the narrative.

VI. Monitoring the Effect of Using Gather Town

Before lesson using this app was conducted, students were briefly surveyed regarding their prior experiences with and views toward video conferencing in online classes. The majority of them stated that they are demotivated to participate in video calls, frustrated at the possibility of participating in video calls, believe that video calls are pointless or add no value, they are avoiding video calls whenever they can, and that even when they are "present". A significant percentage of them, 92%, stated that they have no interaction nor verbal communication with none of the call participants.

The satisfaction, narrative, social interaction (communication type), and attitudes towards the Gather Town lessons were investigated using a survey-based questionnaire with a group of 56 students aged 15–17. The adapted [13] Game User Experience Satisfaction Scale (GUESS) was used. The GUESS-18 is a psychometrically validated 18-item gaming scale that measures nine dimensions of video game satisfaction, including narratives; enjoyment; creative freedom; audio aesthetics; visual aesthetics; personal gratification; and social connectivity. The scale was applied to assess Gather Town and was used to assist in debriefing users on their experience. Participants were asked to respond using a seven-point Likert scale with a response anchor at each rating point (e.g., 1 = Strongly Disagree, 5 = Somewhat Agree, and 7 = Strongly Agree) with one open ended question for debriefing purposes.

Statement 1. was “I am satisfied with the Gather Town lesson", followed by open-ended question: "Please briefly explain your reasons for your respond on statement 1. above”. The teacher stated that this was a question to improve the quality of video call lessons and engagement in the near future and also encouraged students to write down their honest thoughts and ideas. The results of statement 1. show that the use of Gather was well received by the students. Statement 1. revealed that 94 percent of participants were very satisfied with the lesson. They responded, “Strongly agree” (48 students, 86%) or "Agree" (5 students, 8%). There were no explanations nor responses for being either neutral or disagreement. "I am captivated by the game's story from the beginning."

TABLE I. Reason for Satisfaction with Gather Town Lesson

Reasons	***Opinions***
Interest and learning motivation	- It was very interesting because it was a completely new way of video call - It was nice and fun to be able to participate in a video call lesson that is more enjoyable than real classes - It was nice to be able to concentrate well - It was easy to understand the content of the class by following the story - It was so much fun to look for clues with my friends
Self-directed learning	- It seems that I was more proactive than in other video call lessons or in real class because of the possibility to run along with my avatar - I never thought that I would search for math concepts on my own in order to solve the problems
Comfortable interaction	- In other video call lessons I was a little embarrassed to ask questions, but it was great to be able to ask questions and communicate any time with my colleagues. - I felt more comfortable than taking classes in the classroom. - Even though it was the video call lesson, it was nice to be able to “mingle” around and do team or group activities. - It was nice to bump into people in the castle and communicate with them - It was great to have the possibility of entering the room to communicate with people present
Others	- It was nice to attend this lesson and the use of avatars; I felt better than in real classroom, - It was good awesome to communicate with the professor while my avatar was dancing, - With the available whiteboards around, it was easy to collaborate while solving problems - It was awesome because it seemed like a class was specially customized for me.

(91%); "I enjoy the story provided by the Gather." (96%).

Because the reasons for learners' satisfaction with the Gather lesson were so varied, opinions were grouped depending on whether they appeared at least four (or more) times. Table 1. shows learners' individual perspectives on their satisfaction with the Gather lesson.

Statement 10. "I find the Gather Town supports social interaction between players." was also followed by an open-ended question: “Please briefly explain your reasons for your respond on statement 10. above and name the number of persons you have interacted with.”. Only 2% of students did not interact (communicated orally) with any of their colleagues, while 34% communicated with only a few (2-3 persons). More that 64% of students interacted with the whole or majority of the group.

With motivating game features, the held lesson had a beneficial influence on learners' communication, engagement, and learning interests while also assisting them in developing self-directed learning. These views directly reflect the effectiveness of Gather Town lessons. According to the viewpoints, the level of fun, simplicity of access, ease of use, and level of communication are unique qualities of Gather lessons. As a result, educators must make the most of these features when conducting video calls (conference calls).

VII. Conclusion

Web-based videoconferencing system design and optimization should move toward a more human-centered approach. For instance, the next generation of web-based videoconferencing systems should empower learners and educators alike to make choices and leverage the technology to enhance the virtual learning experience rather than limit it due to system capability limitations. Another connected issue is how to reduce the distance between educators and students, students and students, and students and content. This is one of the most significant difficulties facing videoconferencing systems in the future. All these issues were successfully resolved with the created lesson using gamification, intangible cultural heritage, and the web-conference app, Gather Town. The results of the study showed that facilitating in-person connections with avatar use increased students' social engagement as well as lesson satisfaction. Additionally, it implies that various sorts of social interactions influence learners' behavior when it comes to gamification. Gather fostered social connections through the use of gamification and collaboration within an online learning environment using a videoconference tool.

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