

The effects of video gaming on academic effectiveness of higher education students during emergency remote teaching

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ABSTRACT

The pandemic caused a new digital scheme of work to be implemented in higher educational institutes to avoid physical contact, which is referred to as emergency remote teaching in the literature (Hodges, Moore, Lockee, Trust, & Bond, 2020). The inevitable consequence of emergency remote teaching (later on ERT) was that the students' inter-and extra organisational relationships decreased significantly (Pusztai & Győri, 2021). Based on the results of previous studies, we know that the lack of student relationships is strongly related to ineffectiveness (Astin, 1993; Pusztai, 2015; Tinto, 1975), which was also identified during the period of ERT (Pusztai & Győri, 2021). In the current study, firstly, we hypothesised that the students' social interactions, which were accomplished by video gaming, could compensate for isolation (Pisan, 2007) and improve their effectiveness. Secondly, we hypothesised that video gaming might prove ineffective due to stressful and uncertain periods as well as avoidance of activity. In our study, we applied database analysis (Learning Alone database, $N = 677$) and half-structured interviews ($N = 19$). In the quantitative sample, we identified that increased gaming time (compared to the time spent before the pandemic) was related to persistence reduction, whereas similar results were obtained with the reduced playing time. In addition, the interview participants reinforced that they used video gaming as a tool to maintain their relationships during ERT, and they tended to do so in their relationships with other students as well. Thus

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it can be said that video gaming is an extracurricular activity that could affect academic effectiveness positively and negatively at the same time.

KEYWORDS

emergency remote teaching, video gaming, effectiveness, higher education

INTRODUCTION

We know from previous researches that academic success is a determinant factor in institutional embeddedness (Astin, 1993; Pusztai, 2015; Tinto, 1975). Due to emergency remote teaching, the habits of maintaining relationships have almost completely diminished, and they have been diverted to the online space. The possibilities of the online space, contrary to what was expected, have not been able to substitute the students' relationships related to the institute adequately. This, in turn, significantly deteriorated students' academic performance during the period of emergency remote teaching (Pusztai & Győri, 2021). The aim of the current study was to examine such a group of students, in which case the online existence depended with the activity of video gaming since online video gaming could function with the opportunity of maintaining relationships. That is why video gaming could be helpful against students' loneliness (Pisan, 2007), thus contributing to the reduction of dropouts (Pusztai, 2015; Pusztai & Szigeti, 2018). However, video games could prove dangerous, in extreme cases causing addiction which could harm the effectiveness of students (Demetrovics et al., 2012). Because of the antithetic effect of video gaming on the effectiveness, we wanted to detect whether the increase in video game consumption during the ERT positively or negatively impacted the students' academic performance and commitment.

The dangers of emergency remote teaching to efficiency

In 2019 the whole world was affected by the epidemic that has defined our lives ever since. Because of the rapid and global expanse of this virus, the educational institutes were closed according to the advice of experts, which led to the initiation of a new, digital work schedule that affected 1,6 million students worldwide considering the data provided by UNESCO. In order to make this digital transition unhindered, UNESCO suggested numerous methodological opportunities, tools, and educational software for the teachers (UNESCO, 2020). However, this digital education form was far from the true definition of distance learning, so the designation of emergency remote teaching proved to be the most appropriate. Namely, institutes did not have enough time to rethink the methodology, platform, or even implementation of online teaching. All of this was heightened by that; however, the university improvised the good solution, and the lecturers have still experienced the established situation as stressful, which undoubtedly affected the quality and effectiveness of teaching. For this reason, it can be said that the most important aspects of success were missing from the new work schedule, which is no other than the carefully thought-out decisions (Hodges, Moore, Lockee, Trust, & Bond, 2020).

The studies, however, investigated not just the attitudes of teachers and students, the education policy decisions, the insufficiency and difficulties of methodology, or the skills considering ICT use (Ferdig, Baumgartner, Hartshorne, Kaplan-Rakowski, & Chrystalla Mouza, 2020; Kristóf, 2020; Rapanta, Botturi, Goodyear, Guàrdia, & Koole, 2020), but even the effects of the



institute related inter-and intragenerational relations on the effectiveness (Pusztai & Györi, 2021). The current study examines the effects of student relationships on the effectiveness, so it is essential to define academic achievement for further progress. Determining academic effectiveness is not easy because it is essential to follow which paradigm the study begins the investigations. The reason behind this is that one-half of the effectiveness conceptions investigate in the connection system of education, while the other in the students' relationship system. In the case of education's connection system, the degree acquiring is an indicator of effectiveness which is strongly related to its quality. These two are precise and good measurable indicators of effectiveness. Contrary to this, the researchers question the comparability of the acquired knowledge and skills from the point of effectiveness. Based on the extra-institutional connection systems, the degree of effectiveness is found in the workplace's applicability. However, this approach for many seems far too simplified to define effectiveness. For this reason, Pusztai emphasised that effectiveness is a complex concept, which requires a multidimensional approach (Pusztai, 2017).

The current study aims to grasp effectiveness as a way for the successful accomplishment of studying. For this, we are committed to Pusztai's six-dimension paradigm of effectiveness. Firstly, she mentions the student persistence related to the accomplishment of studying, which embodies the students' commitment to their goals and tasks. The concept of moral integrity is the second, which is the individual's relation to the institutional system of rules (e. g., norm-following preparations for exams). The third dimension is the engagement related to instructional work. This dimension shows the students' concern about instructional duties and the quality and quantity of energy invested in these activities. The fourth dimension is the adaptability related to future studies, which essentially embodies the processes of non-compulsory self-education. The fifth factor of effectiveness provides a framework for students to adapt to the meaning of life. Finally, the sixth and final dimension, which was mentioned by Pusztai, is social responsibility. She emphasises this element from the view of effectiveness because she considers social responsibility an essential condition of social embeddedness (Pusztai, 2017).

Among these dimensions, student persistence and engagement received particularly great attention in the literature. However, it is important to note that the correlation of these two is not a statutory requirement but essential for obtaining a degree. Nowadays, it is evident that student persistence and engagement are not related to the student's individual-level attributes and social-economic situation but institutional variables. Thus higher educational socialisation has an indispensable role in academic performance (Pusztai, 2015; Pusztai & Szigeti, 2018).

This is particularly important as not only the goal- and performance-oriented students apply to higher education due to the expansion of higher education, but also student communities have expanded among students with lower socioeconomic status. In the new, diverse student communities, the institutional embeddedness became more important from the point of effectiveness, which can be acquired through interinstitutional relationships (Pusztai, 2015). That is why the question rightfully emerges, at which rate can the institutional embeddedness be acquired in the time of obligated isolation and in what direction will this change during the pandemic period?

The connection of higher education effectiveness and student relationships

Pusztai (2015) was the one who typified the student relationships. Firstly, she typified the relationships, which were differentiated as intra-organizational and extra-organisational



relationships. The connection between student relationships and effectiveness was studied extensively (Astin, 1993; Pusztai, 2015; Pusztai & Győri, 2021; Tinto, 1975). The student relationships with fellow students (intra-generational intra-organizational) particularly received significant attention. It was identified that the role of student relationships is the most determined in reducing dropout, namely those students, who are maintaining relationships with their fellow students, are more likely to get hold of much more information and opportunities. Excellency is mainly nourished by the relationships with the lecturers (inter-generational intra-organizational). Even a minimal level interaction with lecturers is sufficient for the student to get hold of adequate knowledge; moreover, if the lecturer performs talent development activities, then this all could lead the student to scientific successes, publications, or even work opportunities (Pusztai, 2018). However, from the student's point, it is best if both relationships with lecturers and fellow students are related to the higher educational institute because the institutional embeddedness will be the most effective in this way (Pusztai, 2015; Tinto, 1975).

The relationship with parents (intra-generational extra-organisational) is also a determinant factor in student effectiveness. Beyond the financial support, parents' role as emotional support increasingly being confirmed (Pusztai, 2015, 2018; Pusztai & Győri, 2021). On the contrary to the previously mentioned dimensions, the positive effect of relationships with extra-organisational friends (intra-generational extra-institutional) on student effectiveness was not always confirmed by the previous studies. The reason behind this is that these external friendships can extract the student from higher education. Thus, for the sake of efficiency, the best solution would be if the students' friendly relationships are related to the institute (Pusztai, 2018).

During a 2020 study, it was identified that the student relationships (both inter-and extra-organisational) had been significantly reduced in the first wave of the pandemic, among which the only exception was the relationships with parents. However, it is also important to note that there were students for whom there was a decline in parental relationships, which negatively affected their effectiveness. Among the intra-organizational relationships, the ineffectiveness was mainly caused by the deterioration of student and lecturer relationships (Pusztai & Győri, 2021). These results indicate that the students could not apply the possibilities of the online space to maintain their relationships during the first wave of the pandemic. This was contrary to what we thought, that the use of widespread smart devices could yield the feeling of being "always on" (Baron, 2008). However, it should not be forgotten that the online student communities were still determinant in the academic effectiveness during the pandemic (Arkhipova et al., 2020).

Video gaming as an opportunity to maintain relationships

Video gaming got new exposure during the pandemic. Online or social video games often create a welcoming environment for creating virtual groups, cooperation, making new friends, or maintaining the already existing relationships of the player in an online space. Video gaming was identified as a potential coping mechanism. Furthermore, its contact-making nature proved a solution against the social isolation caused by the pandemic (Marston & Kowert, 2020). The researchers pointed out that video games, beyond the individual reaction, can community building and maintaining relationships (Koster, 2005; Pisan, 2007; Quwaider, Alabed, & Duwairi, 2019). Based on these, it is not surprising that there was an excessive increase in the number of video gamers and time spent with video gaming during the pandemic period (Colley, Bushnik, & Langlois, 2020; Ott, 2020). Nevertheless, it should not be forgotten that behind this



sudden growth maintaining relationships is not just the only intention, but an opposing goal for video gaming could be to escape from problems. We also need to mention an extremely negative side effect which is called gaming disorder. This occurs when video gaming becomes an addicting state of the player, who cannot draw a good line in video game consumption, which could cause physical and mental problems in the given player's life (Demetrovics et al., 2012; Amin, Griffiths, & Dsouza, 2020). In summary, these findings suggest that both positive and negative effects of video gaming on academic effectiveness can be hypothesised simultaneously.

METHODS

In our study, we applied both qualitative (half structured interviews) and quantitative (database analysis) methods to investigate the potential effects of video gaming on effectiveness. The data in both methods was provided by higher education students. In the database ("Learning Alone") we analysed the results of our study from an online questionnaire (the question blocks were adapted from the IESA and PERSIST questionnaires: "student connection net" $\alpha = 0.798$; persistence and engagement $\alpha = 0.841$) during the time when emergency remote teaching was implemented (May and June of 2020). The applied questionnaire can be separated into two parts, before ERT (BERT) and during ERT (DERT) experiences. This database was collected from 29 Hungarian higher education institutes and consists of 677 students' data (172 men, 505 women, average age: 22, the minimum age was 18, while the maximum was 30).

The data for the semi-structured interviews refer to a later period, precisely to March and April 2021. The interview consisted of questions related to the participants' video gaming habits, the potentials about maintaining relationships during this activity and its relation to studying. Furthermore there were questions (the dimensions were: *preoccupation, excessive use, overuse, immersion, social isolation, interpersonal conflicts, withdrawal*) based on Demetrovics et al. (2012) work, considering gaming disorder. The main characteristics of the qualitative database are the following: the sample size is 19, of which 14 participants were male, the average age is 23, the minimum age was 20, while the maximum was 30. This method was implemented to supplement the data provided by the online questionnaire with relevant questions for the current topics.

RESULTS

During the database analysis, we determined that during ERT in the case of the most higher education student (70%, $N = 474$), the time spent with video gaming has not changed, while there was an increase experienced in 19% ($N = 127$) of the students and decrease in 11% ($N = 76$) of them. We differentiated these three groups based on these data results (decreasing video gaming time, no change for video gaming time, increasing video gaming time). From the perspective of these three groups, the relevant items of persistence and academic efforts were analysed. It was highlighted that the increased video gaming did not correlate with the decrease in engagement. However, this cannot be said in the case of students' persistence. With the application of the post-hoc method (Tukey pairwise comparison), we determined that there were significant differences in the average persistence values between those who had not experienced a change in their video gaming time compared to the student whose video gaming



time decreased ($P < 0.05$), and to those students whose video gaming time increased ($P < 0.05$). Those students could be characterised with better persistence values in both cases, whose video gaming time did not change.

To acquire a comprehensive picture of maintaining relationships through video games, we compared the data with inter-organisational friendly relationships. However, we investigated the relationships with fellow students with particular attention because these relationships are the most determinant of academic effectiveness (Pusztai, 2015). With the application of the chi-squared test, we can conclude that there were no significant differences found along with the changes during the two periods in relationships and video gaming.

Since the data from database unravelled that there was a tendency-level change of video gaming time during the period of ERT, furthermore, with the increase and decrease of video gaming time, there was a decline in student persistence. We considered it reasonable to specify our knowledge using an interview method.

During our study, it turned out that the students mostly use video gaming as a conscious recreational activity. Specifically, a significant number of participants mentioned that they applied video gaming to derive stress.

“It is a similarly relaxing, energising activity, such as sitting down to draw a little.”

(Female, 23)

“It helps a lot to decrease frustration, and we can experience a lot of good activities which are good to go through, whether we speak about individual or multiplayer games.”

(Male, 24)

Following this, we turned to our study’s main topic, during which we asked the students how often they use online video games as a tool for maintaining relationships both before and during the pandemic. All of the 19 participants emphasised that they actively use these functions of video games. It was typical before the pandemic that the habits of maintaining relationships have not been exhausted only by video gaming; thus, these relationships were mainly contact-based. However, it was also mentioned that online video gaming could be an excellent tool for making new contacts, supporting the theory of virtual social capital (Alessandrini, 2006; Mandarano, Meenar, & Steins, 2010; Perry et al., 2018).

“I have got to know many people during this period, with whom I would have no opportunity to speak to.”

(Female, 21)

Many of the participants pointed out that playing together helped a lot in contacting their friends. Furthermore, they greatly emphasise the opportunities given by video games (the view of the avatar, hearing to other’s voice, video chat), which could nourish the quality of the experiences.

“I can similarly maintain my relationship with my friends, while we are playing, our way of talk is pretty similar to the contact-based talking.”

(Male, 20)



"In my opinion, it proved to be a huge help, because it can substitute for the time spent with friends, the time spent personally"; "Those times that we could not spend personally, is now spent in video games, so I can speak with my friends daily if I want to."

(Male, 23)

"It allows us to hear each other's voice, not just type in a real-time situation."

(Male, 21)

Although, based on [Demetrovics et al. \(2012\)](#) work, we hypothesised that because in extreme cases, video gaming could become an addiction which could even lead to social isolation. However, from the participants' answers, we can conclude that the isolation caused by video gaming was not typical, but there were some cases where the participants were late from an arranged meeting because of the lack of pause option in online video games.

"Delay occurred, but not to miss a meeting with someone because of video games never happened. If the meeting is previously arranged, then I always strive to be present and, if possible, not be late, but to be honest, I also like virtual meetings, and I mean mutual gaming by it."

(Male, 24)

"There were cases of delay when a match is still on, or I think that another game fits in the remaining time, but not really, however in these cases, the delay was a maximum of 2–3 minutes."

(Male, 21)

Following this, we asked the participants about their engagement. Many participants noted that during ERT, there was an increase in engagement, and they participate in more lessons than before the pandemic. The participants tried to identify the reasons during which those advantages were mentioned that are related to the financial benefits (e. g. less time spent with travelling) ([Hanczár & Blénessy, 2004](#)).

"What is more, I feel like during distance learning I could really be more productive. . . in ratio, I am present in more lessons (currently I attend every lesson) compared to in contact teaching. I do not have to travel if there is a half-hour break; I do not have to walk a certain distance to eat lunch. Thus I have more time, and I am not so tired. The other thing is that I do not have to wake up before a morning lesson with an hour or an hour and a half, a half an hour is enough, and I can even have breakfast."

(Male, 23)

"I feel more engaged, for example, I dare to ask more questions, and I attend more lessons."

(Male, 25)

Besides the increase in engagement, however, we identified signs of decline in engagement as well. From the answers, it was unravelled that video gaming during online lessons is frequent. The students were able to divide their attention and play video games because of the lessons' monotonicity.

"In my opinion, the time (spent playing video games) has not changed but the so-called quality. Let us be honest, there are such times when during a two-hour lecture, students begin to play, for example, strategy games, which are played individually, just to pass the time but not concentrating on the game"



fully. In this manner, I could say that during distance learning, the time I truly spend playing video games is forced back.”

(Male, 21)

Finally, considering student persistence, the participants have not reported any decline comparing the two periods; however, this finding is the opposite of the Learning Alone database's results, which draws attention to the differences between the first and the third wave of the pandemic.

DISCUSSION

Based on our results, we could conclude that in the case of the examined students, the time spent with video gaming 19% of the sample has experienced an increase, and 11% of the sample has experienced a decrease which is different from the results of [Colley et al. \(2020\)](#). Following this, the average values of student persistence and engagement along the video gaming time were compared, which led to the results that both video gaming time increase and decrease generated a decline in persistence. We presume that the reasons for the relation between the decrease of video gaming time and the decline of persistence could be the lack of other recreational activities and the sudden encumbrance. Behind the relation between the increase of video gaming time and decline of persistence could be a potential symptom of the gaming disorder specified by [Demetrovics et al. \(2012\)](#). Following these, the results of [Pusztai and Gyóri \(2021\)](#) were reinforced since the students have not applied their online opportunities during the ERT because the video gaming habits did not show significant correlations with the relationships of the students.

In applying the interview method, our determinant result was that every participant pointed out the potency of video games to maintain relationships. Most of them spoke about video gaming as a conscious recreational activity. This finding draws attention to the presence of a new extracurricular activity, which could play a determinant role in academic effectiveness. Further, keeping in mind a potential adverse side of video gaming, the phenomena of gaming disorder as an important topic was broached. We determined that in our interview participants' case, some gaming disorder symptoms could be identified, but these were such as meeting delays and the characteristics of flow-state. In the area of engagement, we found ambivalent results. Many of the students highlighted the advantages of the distance teaching forms, for example, the parallel attendance of more lessons or the decrease of travelling time ([Hanczár & Blénessy, 2004](#)). On the contrary, however, in the case of our participants, video gaming during lessons was also frequent. Behind this could be the lectures' monotonicity and the weaknesses of lecturers' methods. Finally, in the case of student persistence, our participants have not reported a significant decline comparing the two periods, which result is in contrast with the large sample database's results.

CONCLUSION

The aim of our study was to investigate and compare the variation of time spent with video gaming before and during ERT, furthermore to compare these results with variables like student persistence, engagement, and student relationships.



During our study, we recognised that the decline in persistence only was present if there was either a positive or negative change in video gaming time during the pandemic period. Considering engagement, video gaming time, and student relationships, we did not find any significant differences or correlations. All of these could refer to that video gaming has not affected the efforts of accomplishing studies in the first wave of the pandemic, however this way, we could not reinforce the results of Pisan (2007) about the opportunities of video games for making contacts. On the contrary, the data collected during our interview method revealed the opposite. At this point, we find it important that these results could not be compared in all means because the interviews were collected during the third wave, while the questionnaires were collected during the first wave. Comparing to Pusztai and Györi's (2021) results, there is an advancing tendency, which could refer to that people start to "learn-into" the online way of maintaining their relationships and identified the potentials in video games as well. Besides this, our study reinforced the expanding effect of social capital in virtual relationships as well (Alessandrini, 2006).

In conclusion, we could say that video gaming does not always turn into communal activity, but this characteristic became conspicuous during the pandemic. However, it is important to note that mutual online video gaming has a surplus compared to other online relationship maintaining habits (chatting, video chat, etc.), which is primarily due to its community creating effect (Békési & Kovács, 2020). Thanks to the relationship maintaining the effect of this new extracurricular activity, it reinforces institutional embeddedness, which could be effective distance teaching forms, where physical contact making is not possible. Active online gaming platforms could nourish the quality of the student-student and the teacher-student relationships by providing an interactive and fun environment. During the analysis of effectiveness' predictors, there were results similar to that of sports activities. Video gaming fundamentally has a motivational effect on effectiveness, but if the time spent with video gaming goes to the expense of academic duties, the observed results would be the opposite (Kovács, 2018).

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