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To cite this article:

Vázquez-Martín, C., Ramírez-Hurtado, J.M., & Vázquez-Cano, E. (2025). Impact of video game use on fostering creativity in Waldorf School students. *International Journal of Technology in Education (IJTE), 8*(1), 174-192. https://doi.org/10.46328/ijte.1020

International Journal of Technology in Education
2025, Vol. 8, No. 1, 174-192 https://doi.org/10.46328/ijte.1020

Impact of Video Game Use on Fostering Creativity in Waldorf School Students

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Article Info

Article History

Received:
17 September 2024
Accepted:
28 December 2024

Keywords

Video games
Creativity
Waldorf schools
Multiple Correspondence Analysis (MCA)
Extracurricular activities

Abstract

This study investigates the impact of video game usage on the creativity of students attending Waldorf schools. The research aims to: (1) analyze daily time spent on video games and its influence on creativity levels, (2) explore the effect of devices used for gaming, (3) identify the most popular game genres among students, and (4) assess the influence of other activities on creativity. A sample of 146 Waldorf students was analyzed using descriptive statistics and multiple correspondence analysis (MCA). Results show that most students play video games for 0–2 hours daily, with a notable gender difference—girls are less likely to play. No significant correlation was found between gender and time spent gaming (Spearman's coefficient = 0.065, p-value = 0.435). Furthermore, students with lower creativity scores often played puzzle games and used tablets, while those with higher creativity scores favored shooting and fantasy role-playing games, using consoles or computers. MCA revealed that higher creativity students frequently engage in musical and artistic activities, while lower creativity students rarely participate in physical exercise. These findings suggest nuanced relationships between gaming habits, device usage, and extracurricular activities in shaping creativity among Waldorf students.

Introduction

Waldorf education, also known as Steiner pedagogy, is an educational approach developed by Rudolf Steiner, the founder of anthroposophy (Richter, 2000, p. 25). Waldorf pedagogy, commonly framed within the so-called active schools, emerges as an alternative and expression of discontent with what is considered traditional schooling (Carneros & Murillo, 2017; De Coster et al., 2009). It emphasizes that traditional schools continue to offer the same structure as those founded almost a century ago: a teacher facilitating knowledge before students who listen, only to be later evaluated and graded according to fixed objectives, generally set by educational law (Dintersmith, 2018), and characterized by rigidity, authoritarianism, and uniformity (Carbonell, 2016). In a context where electronic devices are used more frequently and at increasingly younger ages (García-Jiménez et al., 2020), one of the major differences offered by Waldorf schools compared to traditional schools is the absence of technology in the classrooms, as its use could hinder social interaction, promote social isolation, and limit creative thinking (Setzer, 2016), arguing that this factor positively influences students' creativity (Stehlik, 2008).

Waldorf education emphasizes imagination in learning, presenting material in a creative and artistic manner. In Waldorf schools, there is a strong emphasis on artistic and creative activities, inquiry-based learning, the development of imagination, and students' critical thinking. In this sense, the Waldorf educational approach is developed through creative and experiential learning methods (Lutzker, 2022).

Creativity is considered "one of the most complex and fascinating dimensions of human potential" (Fulkerson & Horvich, 1998, p. 756). According to the Organization for Economic Cooperation and Development (2018), in its report *The Future of Education and Skills: Education 2030*, it is noted that in an increasingly volatile, uncertain, ambiguous, and complex environment, the development of creative thinking is a key element to drive innovation, solve economic, social, and cultural dilemmas, and support higher living standards.Creativity is defined as the ability to generate ideas or solutions that are both novel and appropriate within a specific context (Runco & Jaeger, 2012). Guilford (1950) introduced the concept of divergent thinking, highlighting the capacity to generate multiple solutions to a problem. Various theories of creativity recognize the importance of divergent and convergent thinking processes, motivation for the task, and a rewarding environment to support creative engagement with a given task (Amabile & Pratt, 2016). In this vein, Granic et al. (2014) explain that video games could increase intrinsic motivation by offering immediate feedback and reward systems, which encourage players to engage creatively in the proposed tasks.

Time Spent Playing Video Games and Creativity

Video games are a global leisure phenomenon; in 2020, the worldwide gaming population reached a total of 2.7 billion users, an increase of more than 6% compared to the previous year (Newzoo, 2020). In the United States, an estimated total of 190.6 million gamers is expected in 2024 (Entertainment Software Association, 2024). Research on the effect of video games in cognitive, motivational, emotional, and social fields has increased significantly over the last decade (Granic et al., 2014). Various studies have yielded both positive and negative results regarding video game consumption and creativity (Bereczki & Kárpáti, 2021). However, Sala et al. (2018) warn that although experimental studies may conclude with short-term correlational results in controlled contexts, this does not guarantee that such findings translate into an immediate improvement in these cognitive skills.

Regarding the frequency of video game consumption and creativity, various studies have addressed this topic with differing results. Hamlen (2009), in a sample of 105 fourth- and fifth-grade students in the United States, found no significant relationship between the time spent playing video games and creativity scores. Conversely, Jackson et al. (2012) found significant positive correlations between the frequency of video game play and multiple indicators of divergent thinking in a sample of 491 subjects approximately 12 years old—a conclusion similar to that obtained by Bereczki and Kárpáti (2021) in a study with 370 subjects.

Čábelková et al. (2020) found different results depending on the gender of the subjects. They identified that male students who spent more time playing video games exhibited a lower index of emotional creativity, contrary to what they observed in female students. Those who played more frequently showed a positive correlation with originality in emotional creativity. Reynaldo et al. (2021) suggested that moderate use of video games could have

positive effects on cognitive functions, problem-solving skills, and creativity. They also pointed out that video game consumption involving strategic thinking, problem-solving, and creativity could stimulate the brain and improve cognitive abilities. However, excessive use could have negative consequences such as decreased productivity, neglect of responsibilities, and possible negative effects on mental health. Similarly, Oscarido et al. (2022) indicated that video game consumption could have a negative impact if games are played continuously without interruptions, potentially leading to losing track of time, accumulating pending tasks, and affecting decision-making capacity due to overstimulation and hyperactivity of the brain.Finally, it was found that the family environment significantly influenced the time participants spent playing video games. Chaibal and Chaiyakul (2022) found a positive correlation between the frequency of phone and tablet use by the subjects and the time that other household members spend using these devices.

Devices Used in Video Game Consumption and Creativity

Nowadays, the global video game market is primarily driven by mobile games, and the reasons for this development can be found in the general shift from other gaming devices and consoles towards mobile devices. In recent years, the interest of video game developers and players has moved from traditional gaming (video game consoles, including handheld consoles, and PCs) to mobile gaming (smartphones and tablets) (Daniels, 2019). The revenue share of mobile games has steadily grown since 2012 (Tom, 2018). In 2018, mobile games were, for the first time, the largest subgroup in the global video game industry (Newzoo, 2018). Meanwhile, the revenue share of traditional gaming has decreased from 63% (Newzoo, 2016) to 49% (Newzoo, 2018).

Cai et al. (2022) created a research model based on the Push Effects, Pull Effects, and Mooring Effects (PPM) framework, which explains the possible motivations for this transition from traditional electronic consoles to smartphones.

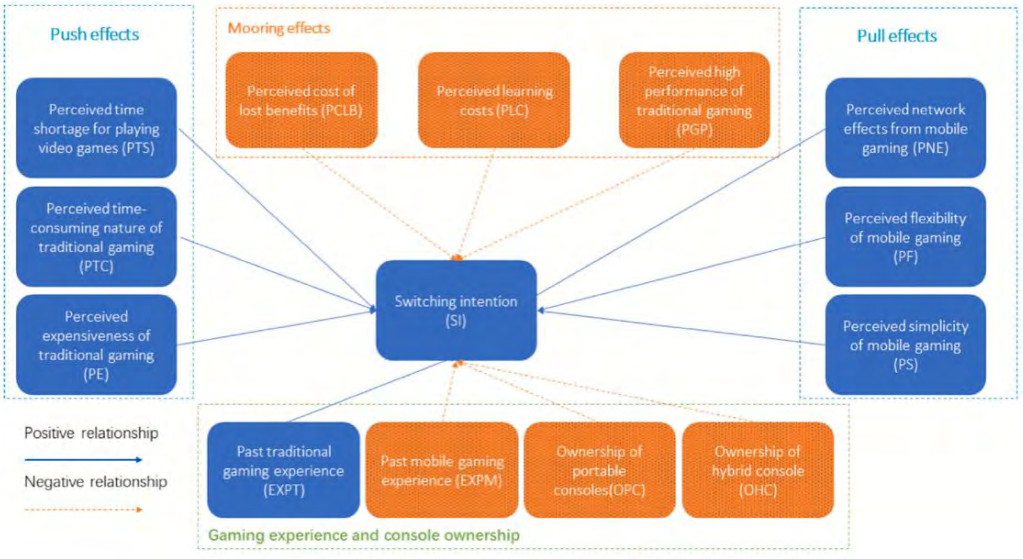

Figure 1.PPM Model

Note. (From Cai et al., 2022)

Push effects refer to negative factors that drive individuals away from their current situation. In the context of video games, this could include dissatisfaction with traditional games, perceived time constraints, or high purchase prices associated with traditional gaming platforms. Pull effects are positive factors that attract individuals to a new situation or device change. For gamers, this might include the convenience, accessibility, and appealing features of mobile games that draw them away from traditional gaming. Lastly, mooring effects refer to reasons that hinder or complicate the decision to switch between devices. These include emotional attachments to traditional consoles, concerns about losing skills or benefits within the same game, or the perception of difficulty in transitioning to a new platform, leading to increased frustration during the experience.

Similarly, the devices used to play video games also influence their impact on creativity. The literature review indicates that depending on the electronic device used to play video games, there will be a greater or lesser benefit in the development of creative thinking, which is directly related to the control opportunities these devices offer over the game. Playing video games on a PC or console could improve cognitive skills more effectively than using a smartphone or tablet because the latter are more likely to have much simpler and more limited control systems (Reynaldo et al., 2021).

Studies also suggest that the immersive experience provided by more sophisticated video game consoles could lead to a better experience and, consequently, to more significant improvements in cognitive skills, including creativity. On the other hand, video games designed for smartphones, although they may offer positive effects, do not provide the same level of cognitive stimulation as other more sophisticated gaming devices (Reynaldo et al., 2021). Similarly, Jackson et al. (2012) demonstrated that while video games played on both phones and computers increase creativity, the complex controls and more immersive experience of computer games can provide deeper cognitive engagement compared to games on mobile phones, which tend to be more casual and less immersive.

Type of Video Games and Creativity

The relationship between video games and creativity is complex and multifaceted, as different game genres offer varied experiences and cognitive challenges. From a theoretical perspective, video games can be considered environments that provide different stimuli, motivating users to engage in a wide range of activities that demand the use of various cognitive skills. These environments may require the coordination of different cognitive processes such as attention, visuomotor skills, and real-time reasoning to reach creative solutions to different problems posed (Ibanez, 2022).Granic et al. (2013) pointed out that the large quantity and diversity of video games, in terms of the dimensions in which they can vary, pose the problem of developing a game taxonomy. In response to this complexity, they developed a taxonomy based on two dimensions: the level of complexity and the extent of social interaction. Their taxonomy is presented in Figure 2.

Using the taxonomy of Granic et al. (2013), the games used in most research fall into two quadrants: Complex-Social and Complex-Non-Social. In the complex-social quadrant, we find genres such as action, shooters, and fantasy. Regarding first-person shooter (FPS) games, various studies show how their use benefits the development of creativity. Steenbergen et al. (2015) indicate that their use could improve cognitive flexibility by requiring

players to switch quickly between tasks and respond to changing environments. A study published in *PLOS ONE* highlighted that FPS games enhance the consecutive execution of different actions in a chain or cascade, which is the ability to efficiently generate, process, and execute goals and responses of separate tasks. This skill is essential for multitasking and quickly switching between different cognitive tasks, both beneficial for creative problem-solving (Steenbergen et al., 2015). Although action games, including FPS, have shown benefits in terms of cognitive flexibility, other studies have found that they are not necessarily associated with improvements in long-term problem-solving skills. For example, a longitudinal study showed that playing strategic video games had a higher correlation with improvements in problem-solving skills than action games (Adachi & Willoughby, 2013).

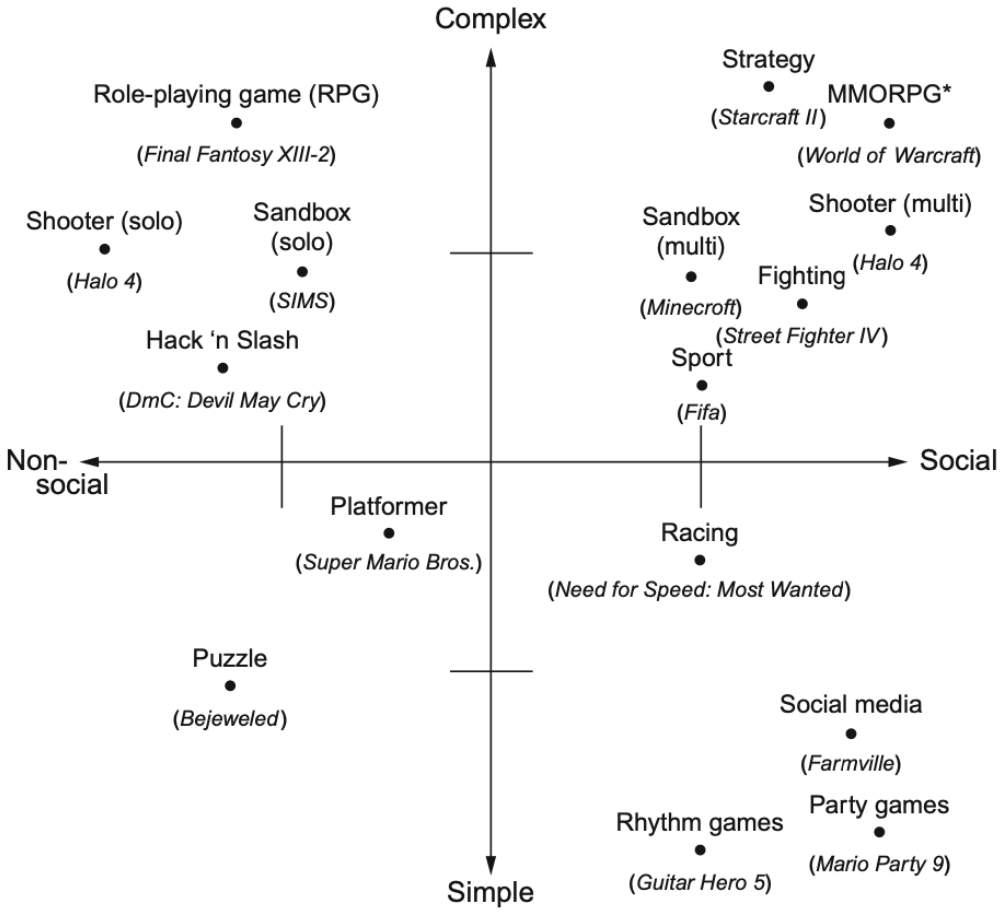

Figure 2. Conceptual Map of the Main Genres of Video Games (With Examples) Organized According to Two Important Dimensions: Level of Complexity and the Extent of Social Interaction Required

Note. (From Granic et al., 2013)

Similarly, fantasy genres and role-playing games (RPGs) also positively influence the development of creative thinking. Fessakis and Lappas (2013) suggest that RPGs involving complex narratives, strategic planning, and high cognitive demands lead players to think creatively and develop innovative solutions. RPGs require players to deeply engage with the story, characters, and world-building, promoting imaginative thinking and the ability to create novel solutions within the game's context. Conway et al. (2014) found that games with high integrative and dialectical complexity promoted deeper cognitive engagement compared to other genres, which could lead to

greater creativity as players navigated complex scenarios and plots. Likewise, real-time strategy (RTS) games have demonstrated an ability to improve cognitive flexibility—a crucial component of creativity—more effectively than first-person shooter (FPS) games. These RTS games require players to develop strategies, manage resources, and adapt to changing scenarios, which can stimulate creative thinking to solve the presented problems (Reynaldo et al., 2021).

Finally, open-world games like Sandbox, *Minecraft*, or *The Sims* allow players to create and build within the game, directly impacting the development and practice of players' creative thinking. A study by Jackson et al. (2012) found that this type of video game genre significantly improves creative thinking by providing an open platform that gives players the opportunity to express their ideas and implement them within the universe offered by the game. Additionally, these games promote collaborative creativity, as players often work together to build and explore various ideas, simultaneously improving social and creative skills (Johnson, 2018).

Following the previously mentioned taxonomy of Granic et al. (2013), Yunianto et al. (2024) argue that creativity is amplified when people work together, as they can leverage diverse perspectives and skills to produce more innovative results. The difference in quality and opportunities to collaborate with other players depending on the electronic device used is considerable; while mobile games may allow social interactions, often the quality of interactions is lower compared to other devices and gaming platforms (Bowman et al., 2015).

Vera-Monroy et al. (2024) explain that video games offering the option to collaborate with other players have a positive effect on the development of creative thinking. The integration of game-based collaborative learning not only improves knowledge retention but also fosters essential skills like creativity and innovation among players in a structured environment where they can experiment, take risks, and innovate. Pierroux et al. (2022) emphasize the importance of relational interactions among group members in creative tasks. Collaborative video games require players to communicate and negotiate ideas to achieve common goals. The quality of social interactions can significantly influence the success of the collaboration. Players must share strategies, provide feedback, and support each other, similar to how group members must dialogue to develop and refine ideas. Additionally, conflicts may arise when individual ideas or authorities are defended. In collaborative video games, players face similar challenges, and the ability to manage these conflicts and negotiate roles can lead to more effective teamwork and creative problem-solving.

The ability of video games to facilitate the state of flow is an important factor in creativity. Well-designed video games have clear objectives, adaptive and increasing challenges, and continuous feedback that give the player control in the game environment (Shute & Ke, 2012). Csikszentmihalyi (1997) also highlights that the immersive nature of many video games facilitates players reaching a state of flow, conducive to the development of creative thinking. By engaging in an activity with clear objectives, immediate feedback, and a balance between challenges and skills, a mental state conducive to creative thinking—called the state of flow—is achieved. These elements are clearly visible in video game consumption, especially in the fantasy and shooter genres. Fantasy games offer expansive worlds and complex missions that require strategic planning and problem-solving skills. Shooters demand that players react quickly and adapt their strategies in real time. Both genres provide an adequate balance

between challenge and skill, clear objectives, and constant feedback—essential factors to induce the state of flow and, consequently, foster creativity. The objectives of this study are: (1) To analyze the time spent using video games per day and its influence on the creativity index. (2) To evaluate the impact of various gaming devices on the creativity index. (3) To identify the predominant types of video games utilized by students in Waldorf schools, and (4) To assess the effect of diverse extracurricular activities on the creativity index.

Methodology

Sample

A sample size of N = 146 was collected from middle-school students attending three Waldorf schools in California: WSSD, WSOC, and SAND, using a non-probabilistic and intentional sampling method. The following collection materials were used:

(1) Torrance Test of Creative Thinking (TTCT). To date, the most widely used tests for measuring creativity are divergent-thinking tasks (Kaufman et al., 2008, 2011). The Torrance Test of Creative Thinking is based in part on Guilford's concept of divergent production (Kaufman et al., 2011, 2012) and is currently the most popular instrument in creativity assessment (Cropley, 2000; Kaufman et al., 2008). The TTCT has had proven high reliability and validity for the last six decades through application and validation in over 2,000 studies worldwide, in 35 languages (Millar, 2002). Through TTCT, we will get the dependent variable *Creativity Index*.

(2) Student questionnaire on ICT usage. This is a self-created questionnaire to assess students' video game usage and non-video game related activities. It was validated through a rigorous process involving experts and professors from Spain and the United States that scrutinized the questionnaire's categories of clarity, relevance, and pertinence, drawing on criteria adapted from the content validity study by Galicia-Alarcón et al. (2017). The questionnaire addresses the following dimensions: I: Sociodemographic; II: Time spent playing; III: Devices used; IV: Game genre; V: Other activities.

Both TTCT and the self-created questionnaire were distributed in person and administered on paper. All elements recommended by the CPHS Guidelines on Child Assent and Parent Permission were followed to ensure that our study meets the highest ethical standards. In addition, the research underwent thorough ethical review and approval by the designated Ethics Committee at Universidad Nacional de Educación a Distancia (UNED) with approval reference: 41-SISH-EDU-2023, demonstrating compliance with established ethical guidelines.

Variables

The variables analyzed in this work refer to the devices used for playing video games, the type of video games, and other activities carried out by the students. The creativity index and sociodemographic variables were also considered.

Data Analysis

To achieve the proposed objectives, various statistical methods have been developed. On one hand, some

descriptive statistical procedures have been carried out using tables and graphs with SPSS. The methodology of Multiple Correspondence Analysis (MCA) has also been used. MCA is an advanced statistical technique used to explore and visualize the relationships among multiple categorical variables. This technique is an extension of Simple Correspondence Analysis (CA), allowing the decomposition of the inertia of a multidimensional contingency table into latent factors or underlying dimensions, thus facilitating the interpretation of complex data structures in the data. MCA converts observed frequencies into row and column profiles, from which it calculates chi-square distances that are subsequently projected onto a reduced-dimensional space. This space is generated through the diagonalization of an inertia matrix, allowing the categories of the variables to be represented in perceptual maps that highlight similarities and differences. One of the great advantages of MCA is its ability to efficiently handle large and complex contingency tables, making it particularly useful in the social sciences where categorical variables are prevalent. The maps generated through MCA can be interpreted such that points (which represent categories of variables) that are close to each other indicate strong associations or similar profiles, while those that are distant suggest significant differences in profiles. This not only facilitates the visualization of relationships among multiple variables but also helps to discover underlying patterns and formulate pertinent hypotheses for deeper research.

Results

First, the time students spend playing video games per day was analyzed. The results can be observed in Figure 1. The majority of students usually spend between 0 and 2 hours a day playing video games. There is also a significant portion of students who do not play video games.

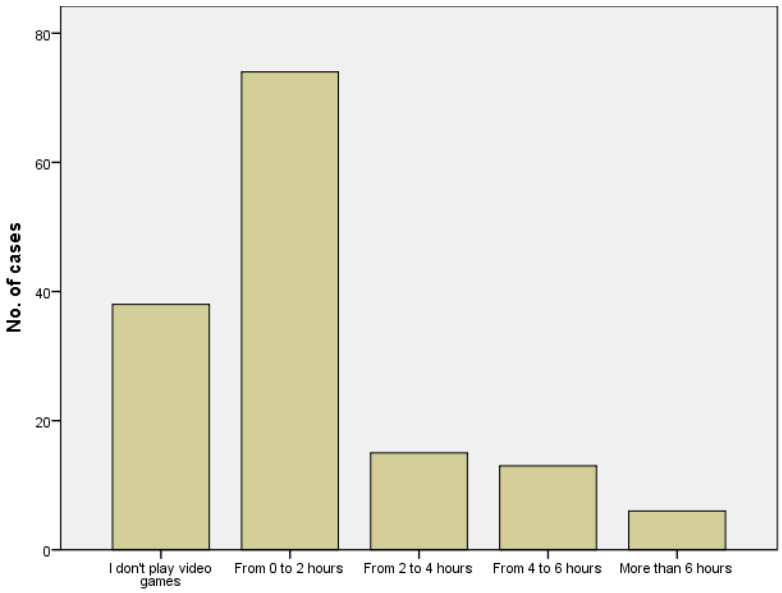

Figure 1. Time Playing Video Games

If we analyze by gender, it is noteworthy that there is a much higher percentage of girls who do not play video games at all compared to boys (Figure 2). In fact, this percentage among girls is very close to that of girls who only play between 0 and 2 hours a day.

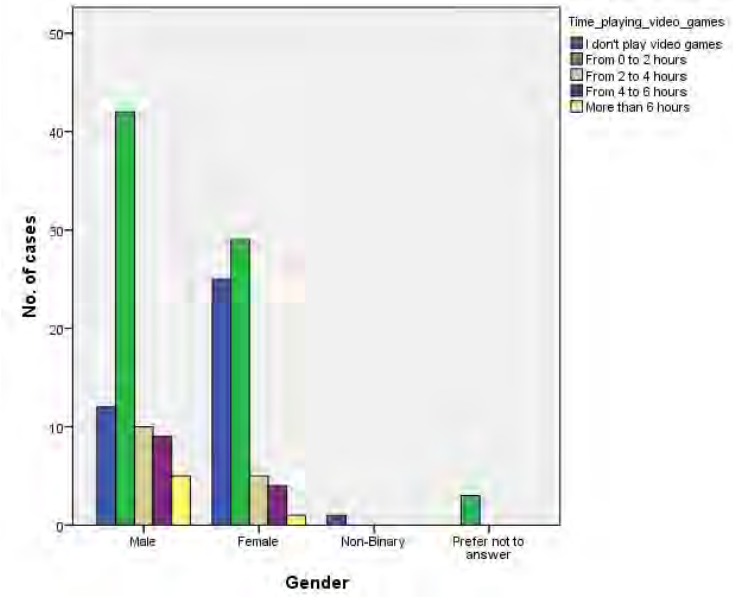

Figure 2. Time Playing Video Games by Gender

Figure 3 shows the graphical representation of the time spent playing video games based on the values of the creativity index. We can observe that across the different values of the time variable, there are no significant differences according to the index values. This information can be corroborated through the Spearman correlation coefficient, given that the variables are measured on an ordinal scale. The Spearman correlation coefficient is 0.065 (p-value = 0.435), indicating that there is no significant correlation between the two variables. This implies that there is no relationship between the daily time spent playing video games and the creativity index.

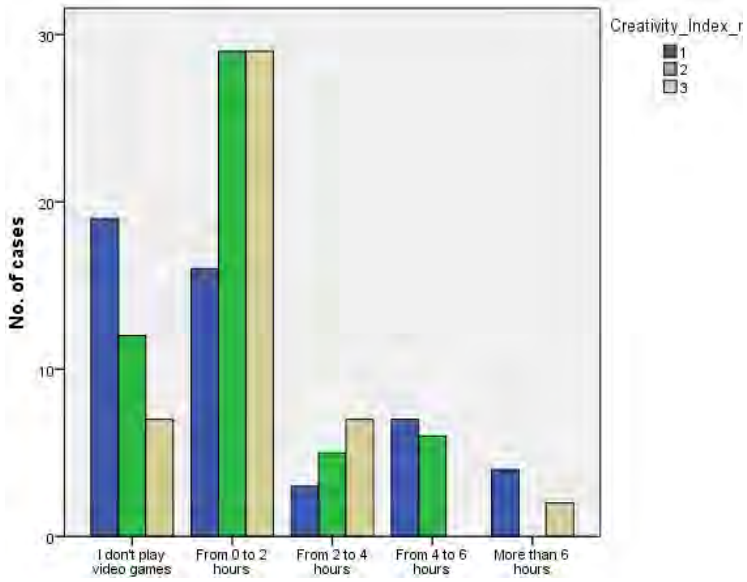

Figure 3. Time Playing Video Games by Creativity Index Values

Another objective of this work was to analyze the type of device used to play video games and its influence on the creativity index. For this purpose, a multiple correspondence analysis was used. Prior to the multiple correspondence analysis, the creativity index was analyzed based on gender and the education level of the

parents/guardians. Regarding gender, no significant differences were found, whereas in relation to the education level of the parents/guardians, it should be noted that students with a higher creativity index have parents with master's degrees, while those with medium or low levels have parents/guardians with predominantly bachelor's degrees. The first information obtained from the multiple correspondence analysis was the model summary table, which shows the Cronbach's Alpha values and the percentage of explained variance for each of the two specified dimensions (see Table 1). The Cronbach's Alpha coefficient indicates the correlation between each dimension and the observable variables. It is observed that both dimensions present high correlations (greater than 0.5), with the first dimension showing a higher correlation. Total inertia refers to the mean of the squared distances of each point to the center of gravity of the cloud of points. It can be observed that the first dimension explains more inertia (35.55%) than the second (34.34%), which is expected since the dimensions are obtained through factor analysis, in which the first eigenvalue explains a greater proportion of information. Therefore, the first dimension is more important than the second. In total, the two dimensions explain 69.89% of the total inertia of the cloud of points, which is acceptable from a statistical point of view.

Table 1. Model Summary (Devices)

	Cronbach's	Variance accounted for		
Dimension	Alpha	Total (eigenvalue)	Inertia	% of variance
1	.547	1.778	.356	35.552
2	.522	1.717	.343	34.343
Total		3.495	.699	
Mean	.535[a]	1.747	.349	34.948

a. The mean of Cronbach's Alpha is based on the mean of eigenvalues.

Figure 4 allows us to identify different patterns or profiles of students based on the analyzed variables.

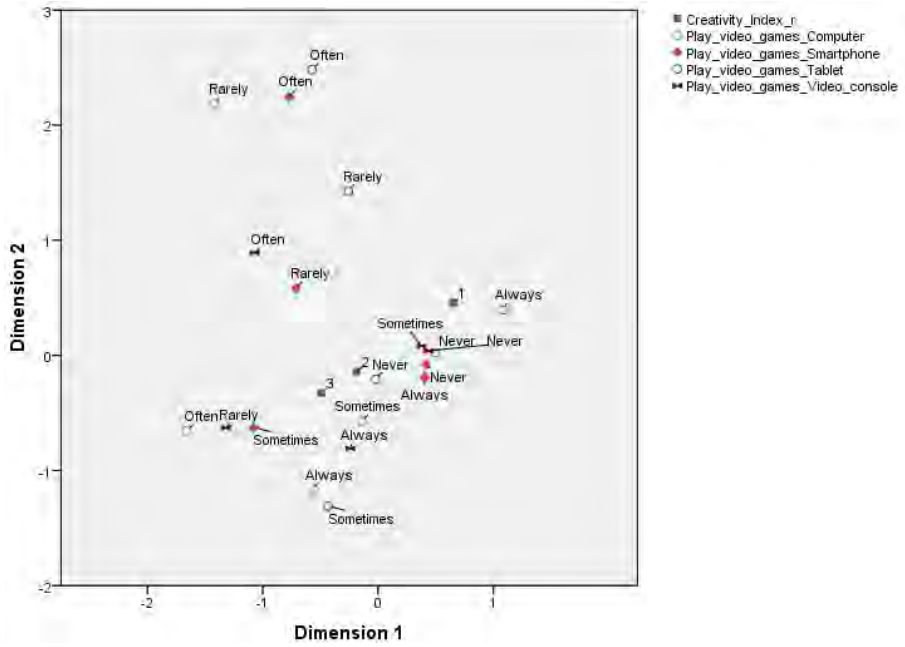

Figure 4. Joint Graph of Category Points (Devices)

To assist in interpreting this graph, the software also provides category point plots for each variable individually (these have not been included to avoid disrupting the structure of the work). The joint plot of category points shows us the correspondence map proper with all the variables. To interpret it, we can look for patterns, groups of categories, or points based on their proximity or distance. In Figure 4, we can observe that students with a lower creativity index stand out for always playing video games on a tablet. Students with a medium creativity index are characterized by never playing video games on a tablet, while they always tend to do so on a smartphone. Meanwhile, students with a higher creativity index sometimes play on the computer and always do so on a game console.

Regarding the type of video game used for playing, the model summary of the multiple correspondence analysis yielded better results than in the previous case, both in the Cronbach's Alpha coefficient and in the percentage of total variance (see Table 2). In this last case, the percentage of total variance explained by both dimensions was 73.41%.

Table 2. Model Summary (Type of Video Game)

	Cronbach's	Variance accounted for		
Dimension	Alpha	Total (eigenvalue)	Inertia	% of variance
1	.804	3.502	.389	38.911
2	.763	3.105	.345	34.498
Total		6.607	.734	
Media	.784[a]	3.303	.367	36.704

a. The mean of Cronbach's Alpha is based on the mean of eigenvalues.

Figure 5 allows us to identify the patterns of students based on the creativity index and the type of video game they use.

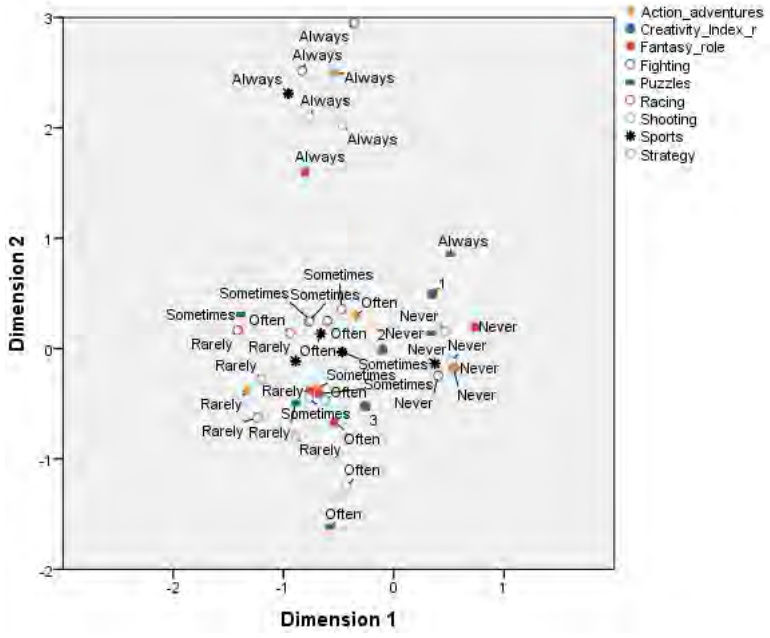

Figure 5. Joint Graph of Category Points (Kind of Video Games)

We can observe that students with a lower creativity index are characterized by always playing Puzzles and never playing Shooting and Fantasy Role games. In contrast, students with a medium creativity index are characterized by never playing Puzzles and often playing Sports games. Finally, students with a higher creativity index are characterized by often playing Shooting and Fantasy Role games.

Finally, a multiple correspondence analysis was also applied to study the impact of various activities on the creativity index. These activities include reading, sports/physical exercise, musical activities, and artistic activities. The model summary showed a total variance percentage of 84.80%, which represents a very high value.

Table 3. Model Summary (Activities)

	Cronbach's	Variance accounted for		
Dimension	Alpha	Total (eigenvalue)	Inertia	% of variance
1	.743	2.467	.493	49.347
2	.545	1.772	.354	35.448
Total		4.240	.848	
Mean	.660[a]	2.120	.424	42.398

a. The mean of Cronbach's Alpha is based on the mean of eigenvalues.

The student patterns are presented in Figure 6. We can observe in this figure that students with a lower creativity index rarely engage in physical exercise or sports. On the other hand, students with medium values in the creativity index are characterized by often engaging in sports or physical exercise, often reading, and rarely participating in musical activities. Finally, students with a higher creativity index tend to read often, sometimes engage in artistic activities, and always participate in musical activities.

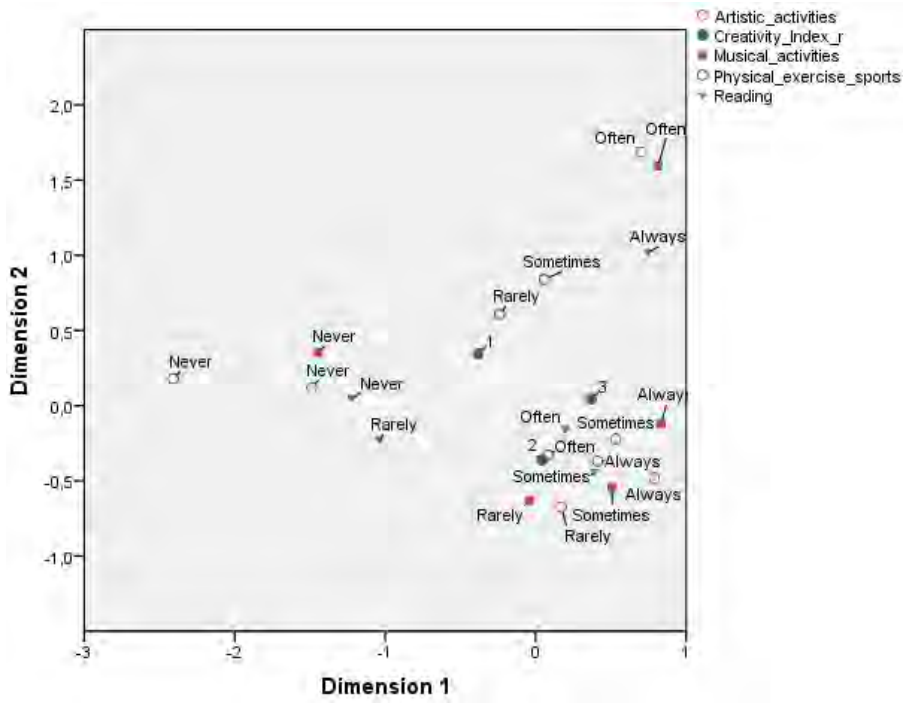

Figure 6. Joint Graph of Category Points (Activities)

Discussion

The findings of this study reveal that the majority of students typically allocate between 0 and 2 hours daily to video gaming, with a significant subset of students not engaging in video games at all. It is noteworthy that a considerably higher proportion of girls, compared to boys, report no involvement in video gaming whatsoever. Concerning the correlation between "Time playing video games by gender," the Spearman correlation coefficient was found to be 0.065 (p-value = 0.435), indicating no significant relationship between the daily time spent playing video games and creativity indices. The impact of video games on student creativity has been extensively explored in the scientific literature, yielding mixed results. Several studies have confirmed the absence of a relationship between video game usage and creativity indices among students (Hamlen, 2009). Conversely, a growing body of research has demonstrated positive effects of video gaming on creativity and academic performance, while other studies have highlighted detrimental impacts on both socio-emotional and academic spheres. Positive outcomes have been documented by various scholars; for example, Mun (2022) demonstrated that engaging in cognitive games with high levels of enjoyment and process-oriented goals significantly enhances creativity in product development tasks, compared to less enjoyable games and control groups. Regarding game typology, Moffat et al. (2017) found that different types of video games, such as Minecraft, can enhance flexibility in creativity, which may prove beneficial for learning.

Conversely, a different set of studies highlights negative effects. Xu et al. (2023) reported that video game engagement negatively influences children's social development, with executive function playing a crucial role, and this adverse effect becomes more pronounced as children grow older. Additionally, Cabelkova et al. (2020) found that increased time spent on video games is associated with lower emotional creativity, affecting aspects such as novelty, preparedness, and effectiveness. Similarly, Dumpit et al. (2021) indicated that the overall time spent on video games is negatively correlated with academic performance among primary school children and active gamers. In line with this, Chen et al. (2020) observed that academic performance across various subjects could be impacted by video game usage, as longer gaming sessions predicted lower grades two years later, though they did not affect basic competencies in mathematics and reading. Prolonged use may also hinder the development of creative problem-solving strategies and decrease the likelihood of engaging with academic content (Adžić et al., 2021). Moreover, Cabelkova et al. (2020) analyzed that more time devoted to playing video games correlates with diminished emotional creativity, including novelty, preparedness, and effectiveness components. This extended gaming not only affects academic performance but also contributes to negative socio-emotional experiences. Doi et al. (2021) demonstrated that excessive video gaming time is positively associated with adverse childhood experiences (ACEs), such as single parenthood, parental history of psychiatric disorders, and peer isolation. Expanding on these findings, Mathers et al. (2009) showed that high video game usage correlates with poorer health status, reduced health-related quality of life, and increased rates of depression and anxiety among adolescents.

Another aspect that may influence creativity development is the type of game played. Analysis conducted in Waldorf schools revealed that students with lower creativity indices predominantly engaged in puzzle games and never in shooting or fantasy role-playing games. In contrast, students with medium creativity indices frequently

played sports games and never puzzles. Finally, students with higher creativity indices often played shooting and fantasy role-playing games. Some studies suggest that various types of video games, including action, sandbox, puzzle, and educational games, can enhance different aspects of creativity, such as originality, flexibility, and elaboration. However, other research indicates that video game play may not significantly influence general creativity levels.

In this context, action video games may enhance creativity, particularly in terms of originality, elaboration, and flexibility, more effectively than non-action games (Yeh, 2015). Puzzle and sandbox games, such as Minecraft, can have varying effects on creativity, with a notable impact on flexibility. These games can immerse students in a more creative mindset, potentially benefiting learning processes (Moffat et al., 2017). When games involve themes related to puzzles, intellectual challenges, or enigmas, they can affect creativity to different extents among primary school students (Mokhtari et al., 2016). However, several studies have shown no significant relationship between the amount of time spent playing video games and general creativity when controlling for variables like gender and grade. It is also important to consider that, in addition to these factors, the influence of computer games on creativity is moderated by the length of time spent playing and the context in which the games are played (Vázquez-Cano et al., 2022; 2023).

Regarding the device used, the results indicate that students with lower creativity indices consistently play video games on tablets. In contrast, students with medium creativity indices never use tablets for gaming but always prefer smartphones. Meanwhile, students with higher creativity indices sometimes use computers and always use consoles. Scientific literature in this area presents findings that contradict those of this study. Several studies have shown that tablets are particularly effective in fostering creativity through interactive and collaborative activities. They enable students to brainstorm, develop solutions, and engage in creative tasks such as drawing and utilizing various technological tools (Kim et al., 2016; Rémon et al., 2017). Moreover, tablets can support online collaborative learning by fostering closer connections between students and teachers, facilitating personalized learning, and enhancing engagement (Selwyn et al., 2017; Oyebola & Ayanlola, 2020).

Finally, a multiple correspondence analysis was conducted to explore the impact of various activities on creativity indices. These activities included reading, physical exercise, musical activities, and artistic endeavors. The results indicate that students with lower creativity indices rarely engage in physical exercise or sports. In contrast, students with medium creativity indices frequently engage in sports or physical exercise, often read, and rarely participate in musical activities. Finally, students with higher creativity indices frequently read, occasionally engage in artistic activities, and consistently participate in musical activities.

Romance et al. (2023) examined the influence of physical activity on creativity among middle school students. They identified a significant relationship between creativity dimensions—namely Originality, Fluency, and Flexibility—and both vigorous physical activity and moderate-to-vigorous physical activity. The study found that higher levels of physical activity, particularly at moderate to vigorous intensities, were associated with enhanced creative abilities. The results also underscored the role of environmental factors, such as social and family contexts, in shaping creativity. The study posits that creativity develops through interaction with the environment,

with physical activity serving as a significant component. Overall, the findings support the hypothesis that engaging in physical activity can enhance various aspects of creative thinking in children, making it a crucial consideration for educational programs.

Conclusion

This study provides a comprehensive examination of the complex relationship between video game usage and creativity among Walford students, with findings that highlight several key aspects. First, the majority of students reported spending between 0 to 2 hours daily on video games, with a notable gender disparity where more girls than boys reported not playing at all. Importantly, the analysis found no significant correlation between daily video game time and creativity indices, supporting previous research that shows mixed results regarding this relationship. The study also reveals that the type of game and device used can influence creativity differently. Students with higher creativity levels frequently engaged in shooting and fantasy role-playing games, while those with lower creativity preferred puzzle games. The device used also mattered, with more creative students tending to use consoles or computers rather than tablets, which contradicts some literature suggesting tablets can foster creativity. Moreover, physical activities were positively associated with creativity, echoing the findings of Romance et al. (2023), who demonstrated that higher levels of physical activity enhance creative thinking. These findings underscore the multifaceted influences on creativity, suggesting that both the type of video game and physical activity play crucial roles in its development.

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