

An Analysis on the Impact of Geogames in Geographical Skills

Leyla Dönmez¹

Eskişehir Osmangazi University, Eskişehir, Turkey

Abstract

Geography course is seen as a memorization-based course for students. In addition, the geography course is patterned with geographical skills that students can use in daily life. It is obvious that not all geographical skills can be acquired in classroom learning environments. Often, an out-of-class learning environment, field and field work is needed. On the other hand, the current pandemic conditions and the distance education process have created an obstacle to in-class learning environments, let alone field work. Students gain the ability to think at a higher level through out-of-class learning environments. For this reason, it is important to use the games defined as GeoGame in the right learning environment during the current epidemic period to turn the disadvantage into an advantage. As a useful perspective on this process that develops under pandemic conditions, it is stated in this study that geographical games can be used to acquire and develop geographical skills. Therefore, the aim of this research is to analyze the effect of interactive games, known as geographical games, on geographical skills. During the research process, it was investigated to what extent games defined as geographical games could help students gain geographical skills. The data collected through document analysis, one of the qualitative research methods, was analyzed in depth within the framework of both the social studies course curriculum and Geographical games in the context of Turkey. The game is not only a means of entertainment, but also has the capacity to create a learning environment for geographical education in schools. When the right game is combined with the right learning environment, an optimum learning environment can be created where children learn while having fun. Extracurricular activities are a teaching method that should be used intensively in geography education. Today's pandemic conditions have brought students closer to the interactive education model. In this process, we can contribute to the acquisition of geographical skills by turning the disadvantageous conditions of the pandemic into an advantage with the motto of learning while having fun.

Keywords: Geographical Games, Geographical Skills, Geography Lesson

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¹ Res. Assist., Eskişehir Osmangazi University, Faculty of Education, Eskişehir, Türkiye.
leyla.donmez@ogu.edu.tr

Geography courses are aimed at strengthening the adaptation of an individual to the environment in which it lives. The course in which human nature interaction is most accurately studied is the geography course. At the same time, Artvinli & Kaya (2010) stated that the skills and field knowledge that can be gained in geographical education can contribute to the effective solution of regional and thematic problems such as socio-spatial inequalities, disasters, sustainable development, environmental problems. The problems of a long spread of activities to achievement geographical skills, lack of access to different venues and lack of materials are present in almost every country (Artvinli, 2020, p. 93). Today, geography courses are being integrated with interactive environments and trying to make them widespread. The spread of distance education, especially during the pandemic process, has also changed the way courses are applied. However, geography course is a course that by its nature requires the frequent use of out-of-class learning environments. In addition, choosing a teaching strategy by entertaining students in the pandemic conditions we are in is what needs to be done for real learning. Spatial thinking ability, which is included in geographical skills and aimed at obtaining geospatial information, is a geographical skill that helps to analyze and interpret every place lived in our immediate environment (Ünlü and Yıldırım, 2017). Therefore, what geographical skills will be gained in the use of geogames in geography course constitute the main problem sentence of the research.

The purpose of this study is to enrich the geography course in pandemic conditions with a content understanding that teaches while having fun, and to use the skills that geogames will gain in the geography course. In today's technological world, there are certain rules that must be observed when organizing students' learning environments. The concept of "digital native", which we call generation Z and which Mark Prensky also mentioned, is exactly the concept that should be used for generation Z. For this reason, the generation of people born into digital technology and familiar with this technology; in other words, the motivational sources of digital natives in learning environments are quite different compared to digital immigrants who have become familiar with this new technology later (Bilgiç, Duman and Seferoğlu, 2011; Cömert, 2020; Prensky, 2001).

At this level first, GeoGames related to geographical skills have been identified and shared with the reader in the literature section. The games hosting GeoGame content are listed as follows. Digital games is a software for entertainment and leisure activities where one or more players can play together on electronic platforms such as a computer and a game console (Frasca, 2001). The characteristic features of geogames can be listed as follows (Andrade et. al., 2020; Yamu, Poplin, Devisch and De Roo, 2017):

- Based on a specific place where the game environment and spatial components can be represented and visualized.
- Focusing on solving a spatial problem related to the citizens of the chosen place;
- The inclusion of rules and elements of pleasure to attract citizens to continue playing and returning to the game.
- Ensuring the participation of citizens in the urban planning process.

YouplaceIt

The main goal of the game YouPlaceIt! presented in this chapter is to enable stakeholders to communicate and resolve urban planning issues. The challenges arise when there are different, and often conflicting interests on how to use natural resources, land, buildings, and how to revitalize and further develop cities and landscapes. We presume that negotiations will take place because the stakeholders and individuals involved wish to re-develop the area, create something new, and resolve problems or disputes. One of the main tasks of the consensus building process is to enable information exchange, communication, and the ability to express views without the fear of backlash from the community or from the powerful parties involved in the negotiation process. In a broader sense, we would like to contribute solutions which could contribute to a more sustainable way of living and co-creation of cities in which everybody feels heard and accepted (Poplin and Vemuri, 2018).

Minecraft

Minecraft is a block-building hit game created by Mojang in 2009. It is the second best-selling video game in the world (behind Tetris) with more than 150 million copies sold. Due to its success, Mojang was bought by Microsoft for 2.5 billion dollars in 2014. The three-dimensional game environment, which is purposefully “pixelated” (polygonal), graphically enables the player to interact with space by building or destroying about 500 types of colored block. Minecraft works similarly to the brick-by-brick building logic of Lego. A few very successful games such as Minecraft, Tetris, and Lego build their representation and spatial language on blocks. They implement a block-building and destroying logic, which indicates that simulating complex issues in a simple spatial logic and a playful way is attractive to players.

The purpose of Minecraft is to enable the player to build creative structures, such as buildings, urban parks, streets, sidewalks, entire cities, and landscapes, or even elements of the environment such as trees, forests, plantations, relief, rock outcrops, soil, and subsoil. These constructions can either be based in real or fictional spatial contexts. In this sense, it enables the player to create the environment that represents a place, a city, a landscape, a continent or even the planet Earth. It can be played by one or more players (if it is available online, in a multi-player mode), in a real territory or in an environment created by the players. The player may use available resources in an imaginary world to convert them into building materials, while defending herself from computer-controlled monsters—if she plays in the survival mode (Reinart and Poplin, 2014).

Project Lily Pad

Project Lily Pad is a Serious Geogame developed over Summer 2018 with the purpose of teaching spatial thinking in terms of disaster resilience. The game is set in the city of Dickinson, Texas, where Hurricane Harvey made its presence on 30th August 2017. Day 1 of the game requires the player to think spatially in unfamiliar territory and navigate using instructions and a paper map to drop off supplies. In Day 2, the player plays as a Cajun Navy officer, (Cajun Navy are an informal group of rescuers from Louisiana and adjacent areas who helped in the hurricane scenario) rescuing people and dropping them off at locations that have elevation, resources and are recognizable as landmarks, coined as “Lily Pads”. The game was developed integrating Geographic Information System (GIS) which was achieved by navigating and transferring data from Open Street Map to ArcGIS to CityEngine to Unity. The

elevation model and flood data were used to model the city and recreate the game with almost real-life accuracy. This game is targeted to all audiences as every citizen should be aware of disaster resilience with respect to flooding or hurricanes. We hope the game can set a framework for many such games in the future as well as play an important role in preparing people better for disasters in the future (Tomaszewski, et al, 2020).

Simcity

Researchers examined the pedagogical potential of SimCity simulation game in urban geography course. College students have used SimCity to build their own cities and have applied a wide range of urban theories to support their urban structures. In addition, students critically evaluated the logic and functioning of SimCity simulation by comparing it with real-world contexts and principles of urban geography. Students have noted that the SimCity event provides them with opportunities to develop their geographical creativity, resulting in the creation of various, unique and interesting cities. The findings suggest that the use of SimCity can be an effective tool for Geographical Education (Kim and Shin, 2016).

Findings

After placing digital games, a study examining the effect of digital games on students' creativity levels is also included in Table 1.

Table 1
Empirical Studies Investigating the Effect of Video Games on Creativity.

1st Author (year)	Country	Age (EL)	Game	Genre	Main Findings
Jackson (2012)	USA	12 (5 th)	205 games	MG	Videogame playing, regardless of the game genre, predicted creativity.
Hamlen (2009)	USA	9 to 11 (4 th - 5 th)	NR	MG	No significant relationship was found between time playing video games, regardless of the game genre, and creativity.
Hamlen (2013)	USA	9 to 11 (4 th - 5 th)	NR	MG	A negative relationship with the level of creativity and time spent playing video games.
Fessakis (2013)	USA	4 to 6 (PS)	Crayon Physics	Puzzle	A statistically significant increase in the average fluency measure, but not in originality.
Hsiao (2006)	Taiwan	9 and 10 (4 th)	RMG	Puzzle	Positive relationship between divergent thinking and divergent feeling with gameplay.

Hsiao (2014)	Taiwan	11 to 12 (5 th)	RMG	Puzzle	Significant improvement of creativity from pre- to posttest compared to the control group.
Blanco-Herrera (2019)	USA	18 to 33 (UG & G)	Minecraft NASCAR	Sandbox Racing	A significant correlation between creativity and game play habits. Those who played <i>Minecraft</i> without instruction showed significantly higher scores on post-game creativity measures compared to those who played <i>Minecraft</i> with instructions (i.e., “be creative”), those who played a driving game, or those who watched a television show.
Cipollone (2014)	USA	9 and 10 (HS)	Minecraft	Sandbox	The open nature of <i>Minecraft</i> can provide students with many opportunities to show and enhance their creativity—especially using machinima projects.
Checa-Romero (2018)	Spain	12 to 15 (HS)	Minecraft	Sandbox	Significant improvement of creativity from pretest to posttest with a moderate effect size.
Karsenti (2017)	Canada	8 to 11 (3 rd - 6 th)	Minecraft	Sandbox	The results from 10 qualitative data collection sources showed that one of the benefits of <i>Minecraft</i> was to increase creativity.
Sáez-López (2015)	USA & Spain	11 to 14 (MS)	Minecraft	Sandbox	The participants reported the application of various 21 st -century literacy skills, including creativity. 96% of the participants thought that <i>Minecraft</i> enhances creativity.
Moffat (2017)	UK	18 to 30 (UG)	Minecraft Portal 2 Serious Sam	Sandbox Puzzle Shooting	Combining all the three groups, playing the games showed significant improvement in all creativity measures.
Hewett (2016)	USA	14 to 20 (HS)	Minecraft	Sandbox	97% of the participants thought that the project done in <i>Minecraft</i> challenged them to be creative and innovative.

Inchamnan (2013)	Australia	18 to 34 (UG)	Portal 2 I-Fluid Braid	Puzzle	Game playing activities significantly enhanced the creative potential of computer games.
Kim (2016)	South Korea	NR (UG)	SimCity	Simulation	83% of the students believed <i>SimCity</i> provided them with an opportunity to develop creativity.
John (2015)	USA	14 to 18 (HS)	WoW Skyrim Final Fantasy etc.	DRPG	In response to a survey, 65% of participants did <i>not</i> believe that games influenced their creativity while 47% believed that gamers are creative.

Notes. EL = education level, NR = not reported, PS = preschool, MS = middle school, HS = high school, UG = undergraduate, G = graduate, RMG = researcher-made game, MG = multiple genres (between 7 to 14 genres), WoW = World of Warcraft, DRPG = digital role-playing games.

In this study, qualitative research methods were designed according to the data. At the data collection stage, a document review was conducted, and the collected data was analyzed by content analysis. Considering the results of the research, the usefulness of GeoGames in geography course shows a very high performance. All the geographical skills that are desired to be gained in the geography course can be given with GeoGames. The studies shown in the literature support this statement. Looking at the social studies course curriculum conducted in Turkey in 2018, an analysis was made of which achievements can be matched with which skills through GeoGame.

Table 2

The Relationship Between Geogame and the Achievements of The Social Studies Course Course, Ministry of National Education, 2018

Achievements Related to Geogames
SS.4.2.2. It gives examples by researching items that reflect the national culture of his family and its surroundings.
SS.4.2.3. Compares traditional children's games with today's games in terms of change and continuity.
SS.4.3.1. It makes inferences about the location of any surrounding place.
SS.4.3.2. It draws a sketch of the spaces he uses in his daily life.
SS.4.3.3. It distinguishes between natural and human elements in the environment in which it lives.
SS.4.3.4. It observes the weather events occurring around him and transfers its findings to illustrated graphs.
SS.4.3.5. It makes inferences about the place where it lives and the surrounding landforms and population characteristics.
SS.4.4.1. Classifies the surrounding technological products according to their area of use.
SS.4.4.2. Compares the past and present uses of technological products.
SS.4.4.4. Based on the needs around it develops ideas for designing unique products.

SS.4.5.5. It uses the resources around without wasting them.

SS.4.7.1. It introduces various countries around the world.

SS.4.7.2. It understands the relations of Turkey with its neighbors and other Turkish Republics.

SS.4.7.3. Compares the cultural elements belonging to different countries with the cultural elements that our country has.

SS.4.7.4. It respects different cultures.

SS.5.2.2. It introduces the surrounding natural assets and historical sites, objects and artifacts.

SS.5.3.1. Maps generally explain the earth shapes of the place where it lives and its surroundings on maps.

SS.5.3.2. It explains the effect of the climate seen in the environment in which he lives on human activities by giving examples from its daily life.

SS.5.3.3. It gives examples of the effects of natural features and human characteristics on the population and settlement in and around its place of residence.

SS.5.3.4. It questions the causes of the occurrence of disasters and environmental problems in the environment in which he lives.

SS.5.4.1. Discusses the impact of technology use on socialization and social relations.

SS.5.5.1. Analyzes the economic activities of the place where it lives and his surroundings.

SS.5.5.3. Analyzes the impact of economic activities around people on their social lives.

SS.5.5.4. Analyzes the production, distribution and consumption network of products aimed at meeting basic needs.

SS.5.5.5. By cooperating, it develops new ideas based on production, distribution and consumption.

SS.5.7.2. The impact of communication and transportation technology on economic relations between countries.

SS.5.7.4. It gives examples of common heritage items found in various countries.

SS.6.2.5. Deciphers the role of historical trade routes in inter-communal political, cultural and economic relations.

SS6.3.1. Defines the geographical position of the continents, oceans and our country using the concepts related to location.

SS.6.3.2. It examines the landforms, climatic features and vegetation on the related maps, which are the main physical geography features of Turkey.

SS.6.3.3. It shows the basic human geography characteristics of Turkey on the relevant maps.

SS.6.3.4. It makes inferences about climatic features based on human lives in different natural environments of the world.

SS.6.4.2. It puts forward ideas about the effects of scientific and technological developments on future life.

SS.6.5.1. It associates the economic activities of our country with its resources.

SS.6.5.2. Analyzes the effects of unconscious consumption of resources on living life.

SS.6.5.3. Prepares investment and marketing project proposals taking into account the geographical features of Turkey.

SS.6.7.2. Analyzes the economic relations of our country with other countries.

SS.6.7.3. Analyzes the roles that our country has assumed in the international arena depending on the political, military, economic and cultural characteristics that it has.

SS.7.1.3. Discusses the role of media in social change and interaction.

SS.7.3.1. Through case studies, he makes inferences about the factors affecting the settlement from the past to the present.

SS.7.3.2. Based on the factors affecting the distribution of the population in Turkey, he interprets the demographic characteristics of Turkey.

SS.7.5.1. Explains the importance of soil in production and management with examples from the past and present.

SS.7.5.2. Evaluates the effects of developments in production technology on social and economic life.

SS.7.5.6. Analyzes the changes caused by digital technologies in the production, distribution and consumption network.

SS.7.7.4. Together with his/her friends, he/she develops ideas and suggestions for solving global problems.

When the attainments shown in Table 1 are examined, it is possible to establish a connection between each gain and GeoGame. This situation makes the lesson a lesson that saves you from boredom and teaches you while having fun. At the same time, the student also learns how to develop new solutions to problems by existing in life. An individual who has acquired creativity and problem-solving skills will also feel the benefit of these skills in his future life. They studied location-based games and how board games can potentially be played in the real-world. Some very successful commercial games, such as Minecraft, Ingress, Pokémon GO, Harry Potter Wizards United, and The Game of Thrones, use a geospatial component in the form of maps, visualizations of geographic context, and places as the central part of the gameplay and their visualizations. Minecraft has evolved into modeling real spatial contexts by its players and represents an example of a geogame with an ability to visualize real-world and its geographic context.

Geogames are an emerging research area that concentrate on the value of place and explore different geospatial visualizations and their implementation in a variety of applications. They may incorporate the poetics of hyper-fiction, becoming a cultural object and a socio-spatial process (De Andrade, 2019). The digital game environment built in Minecraft, Tirolcraft, demonstrated that using a game as a tool can motivate, inspire and engage very young and older children to participate in the urban planning process.

Figure 1

Playground Design for Undugu, Nairobi, Kenya



Figure 2

(A) Block By Block’s Minecraft Design of Accra, Ghana; (B) Block By Block’s Minecraft Design Figure 2. (A) Block By Block’s Minecraft Design of Accra, Ghana; (B) Block by Block’s Minecraft Design Of Les Cayes, Haiti



Figure 3

(A) Minecraft, Geocraft, Ecocraft and Energycraft Conceptual Scheme; (B) Ecocraft Game. Figure 3. (A) Minecraft, Geocraft, Ecocraft and Energycraft Conceptual Scheme; (B) Ecocraft Game. Source: Scholten, Dias and Andrzejewska (2018)



Figure 4

(A) Geoboxers’ Minecraft Design of Copenhagen, Denmark; (B) Geoboxers’ Representation of Christian’s IV old Beer Factory Christian’s IV Old Beer Factory

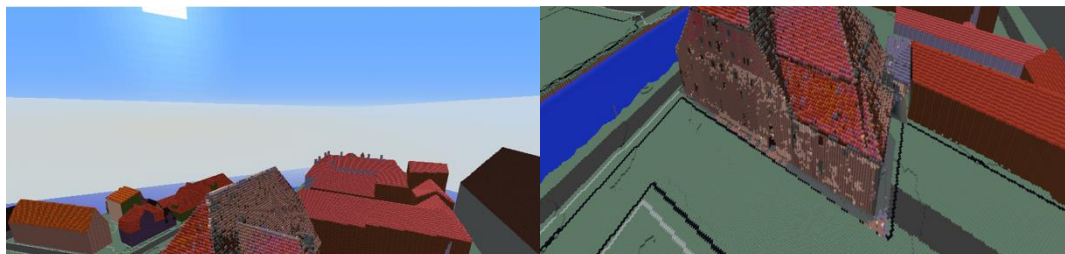


Figure 5

(A) *Minecraft Model of Mønsted And Daugbjerg Mines*; (B) *Mønsted And Daugbjerg Limes*,
 Figure 5. (A) *Minecraft Model of Mønsted And Daugbjerg Mines*; (B) *Mønsted And Daugbjerg Lime*

**Results And Discussion**

It is very important that students are taught to live in harmony with nature in life. The widespread use of computer games in classes also supports this finding (Prensky, 2001a). If the educational computer games offered to students are diversified and the duration is extended, students may have a more positive attitude towards educational computer games. Experimental studies on the effectiveness of educational computer games have been conducted in the literature. As a result of these experimental studies, it has been concluded that educational computer games can be used as an effective learning method (Mitchell and Savill-Smith, 2004, Can, 2003, Tüzün et al., 2006).

Educational computer games provide convenience for achieving the goals contained in the course curriculum (Akpınar, 1999). Computer games are used to fill free time for many students (Buchman and Funk, 1996; p. 12-16). Today's children spend most of their time at the computer, using technological tools and playing video games. For this reason, it is of interest to many researchers who want to use computer games as an educational tool in classrooms (Prensky, 2001b). When these relationships between learning and learning environments are examined, it can be considered that game-based learning environments are a perfect decoy to use in education that meets all these requirements. (Mann, Eidelson, Fukuchi, Nissman, Robertson, and Jardines, 2002; Ebner and Holzinger, 2007; Bottino et al., 2006, Yağız, 2007, p.4). Therefore, active learning that will increase the interest of both students and their success both one way to prepare educational environments, especially in the educational process is to use today's children with a passion for computer games (Yağız, 2007; p.5).

Although educators have various ideas about the use of games in education, Garris, Ahlers and Driskell (2002, p. 441-467), According to Kirriemur and McFarlane (2004), games are suitable for use in education in terms of being instructive and guiding. Games transport students to other worlds, allowing students to reveal their abilities through roles, gain knowledge and skills. In games that are characterized as “competitive exercise”, the goal is to progress and win. To achieve this, the player uses them by learning what they need to learn about the topic (Gredler, 2003, s. 571-582).

According to Hostetter (2002), computer games are an excellent learning tool. Because computer games give students the opportunity to adjust the difficulty of the game, and the user can play the game as much as he wants at any time.

Game-based learning environments create game-based problem-based learning environments that are built into specific problem scenarios. In game-based environments, students create their own problems and collect the necessary information for the solution themselves and solve the problem themselves (Ebner et al., 2007, p. 873-890; Bottino et al., 2006). Expressing that the use of games in schools will increase, Gee (2003) shows the real importance of well-designed computer and video games as recreating people themselves in virtual worlds inside games and achieving both fun and learning simultaneously. Kirriemuir and McFarlane (2004) emphasize that games provide important gains such as strategic thinking, planning, communication, and decision-making.

Considering the general subject areas of the games discussed in the study, Project Lily Pad disaster resistance; YouPlaceIt! Minecraft-Urban Planning and SimCity city planning; Geocaching on the Moon space geography (lunar geography); Geogame FVS is about biodiversity. It has been stated that in the Neocartographer, all kinds of geography issues can be dealt with in the axis of map-based spatial thinking skill. OriGami focuses directly on the training of spatial thinking skills. While Ingress enables its users to explore the city with its pervasive game structure, it also contributes to the development of the players' observation and navigation skills (Adanalı, 2021). This result can be reached from even the number of Pokemon Go players alone (Freese, 2016). In addition, it is a known fact that the use of augmented reality technologies in daily life and mobile devices has become widespread. The main problem here is the scarcity of evidence of the learning outcomes of these geogame applications (Andrade et al., 2020; Baker, et al., 2015; Carbonell Carrera, et al., 2018; Schneider, Schaal, & Schlieder, 2017); when considering especially in the context of this study, it is the lack of proven data on the acquisition of spatial thinking and geographical skills.

Considering the results of the research, the usefulness of GeoGames in geography course shows a very high performance. All the geographical skills that are desired to be gained in the geography course can be given with GeoGames. The studies shown in the literature support this statement. Looking at the social studies course curriculum (MoNE, 2018) conducted in Turkey in 2018, an analysis was made of which achievements can be matched with which skills through GeoGame.

It may not always be enough to give geographical skills with the achievements included in the Turkish curriculum. However, it is inevitable to create a learning strategy that learns while having fun. It is of great importance to gain achievements that teach while having fun and are also included in the curriculum through geographical games.

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About the Author

Leyla DÖNMEZ: is a Ph.D. student in social studies education at the institute of education in Anadolu University, Eskişehir, Turkey. Her main focuses are on social studies education and geographical education.