

## Learning Teamwork via Computer Games: A Phenomenological Approach

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### Abstract

**Background & Purpose:** By the advent of video games as an inseparable part of technology and education, the impact of such games on enhancing the level of teamwork has reached an unprecedented attention. The uppermost objective of this study was to investigate the miscellany of aspects influential on the improvement of teamwork among Iranian Air Force freshmen cadets.

**Methodology:** To this end, 50 freshmen cadets participated in this research by playing Counter Terrorist Game in groups of five (10 groups). They were randomly assigned to each of the groups, however, they all were chosen from among volunteers to play the game with no specific randomization (convenience sampling). Each group played four rounds of the game in two consecutive days (each day two rounds) competitively against the computer. After the second day, participants were in depth interviewed about their lived experiences of playing video games with their coursemates utilizing semi-structured questions concerning various aspects of teamwork.

**Findings:** The researchers also observed the participants playing games and employed field notes in order to record the phenomenon under study. The data collected were meticulously transcribed and analyzed and data-driven themes were obtained using NVivo qualitative data analysis software version 12.

**Conclusion:** By conducting this study, it was revealed that there are ten main themes or categories in the context of game playing that can potentially lead towards learning teamwork features. The themes are goal-setting, identity-formation, premeditation, interaction, implementation, leadership, esprit de corps, companionship, trait and tact.

**Keywords:** Computer Games, Competition, Teamwork, Team Performance.

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## Introduction

The primary focus of the current study was to delve deeper into the area of game playing and its potential impacts on teamwork skills. While it seems that numerous study has been implemented on the other issues related to computer/video game playing like social and prosocial skills, cognitive advantages, aggressive behaviors and pedagogical effects, very few research addressed the relationship between playing computer games and teamwork skills.

Prior research illustrates the fact that computer games support students' learning of teamwork skills (Vlachopoulos & Makri, 2017) and provide a fruitful environment for collaborative and cooperative group work (Wendel et al. 2013). Teamwork skills can be understood as a cover term for various kinds of pedagogical approaches that center-stage students' joint participation either through working in pairs or in small groups (Smith & MacGregor, 2015). In a process of teamwork, students build a sense of shared meaning via interaction and are generally committed to a common objective (Littleton & Häkkinen, 2016). In the same vein, teams tend to be self-managed and encompass roles-shifting (Sawyer & Obeid, 2017). Furthermore, learning is considered to be triggered via social interaction during the process of teamwork (Dillenbourg, 2019).

Learning of teamwork skills can be applied in higher education in multiple ways, e.g. discussions and debates, group problem-solving, and other team activities (Wendel et al. 2013) and emphasizes the significance of cooperation and shared learning (Johnson & Johnson, 1999). In the state of teamwork, individual students contribute to achieving common team objectives by helping their team members (Regueras et al. 2011). Computer-based teamwork skills learning has several advantages (Gašević et al. 2019); it can boost critical thinking skills and creative potential, create an improved sense of a community approach to learning and increase students' integration into the learning community (Haythornthwaite, 2002). Previous research has also recognized potential problems associated with collaborative learning and teamwork like students' being reluctant to take part in team-based learning (Joyce, 2020), where team members enjoy the benefits of collaborative work without contributing as much as others. Prior research in the field of collaborative learning through computer games has built on the principles of co-operative learning by Johnson and Johnson (2002) concentrating on the needs to take the following five components into consideration when planning for collaborative learning; (1) positive interdependence, where students' recognize that they cannot succeed individually but must depend on other team members; (2) individual accountability, where evaluation of each student's performance is heavily reliant on both the group and the student; (3) face-to-face and in-person interaction, which promotes the team's success by helping and encouraging others; (4) social skills, where interpersonal and group work skills are critical to the success of a collaborative team endeavor; and (5) team processing, where team members discuss their progress and relationships together. In order to have a successful collaborative learning, it is imperative that the learning environments support these issues (Wendel et al. 2013).

Concordantly, in the world of game playing, teamwork is essential to complete many a task ranging from obtaining a weapon to defeating a mob. Teams that possess better organizational and team work skills can easily defeat a less organized team. “Being seen and known as a good team player is also very important for gamers who wish to advance in the game. It amounts to a kind of social capital within the game space that can be utilized for mobilizing resources and asking for help from other gamers” (Jakobsson & Taylor, 2003, P. 24).

Therefore, the present study aimed to answer the following research question:  
What teamwork skills can be learned by playing computer games?

### **Literature Review**

Games are influential instruments for learning complicated subjects, as they use action instead of explanation, build personal motivation and satisfaction, accommodate various teamwork skills and styles, support expertise, and provide a context for interaction and decision making (Kebritchi & Hirumi, 2008). The ever-increasing popularity of games in educational settings may be related to their ability to achieve better teamwork learning results and develop competencies for present and future working life (Kebritchi & Hirumi, 2008). Moreover, research illustrates that more attention should be paid to the type and level of learner support in terms of teamwork skills (Leemkuil & De Jong, 2012).

As a form of thought-provoking activity, computer games can affect students’ engagement, motivation, satisfaction and teamwork. They are also beneficial training instruments in management and teamwork education for teaching decision making and strategy planning. Various types of play and play scenarios have become significant for teamwork training (Kark, 2011). Games also provide a functional medium for enhancing cognitive abilities necessary to solve problems in real-life situations, helping to equip learners with information and skills for addressing these problems as a member of a team (Feinstein et al. 2002). Previously conducted research has displayed that computer/video games provide students opportunities to practice decision making and teamwork in natural and complicated situations (Lohmann et al. 2019). Additionally, games can serve as helpful platforms for improving teamwork and leadership skills, particularly for exercising shared leadership. Computer games have been known to be specifically influential in enhancing students’ recognition of leadership and teamwork styles and changing their opinions on these issues (Siewiorek et al. 2013). Prior research also acknowledges the value of computer games in teaching teamwork skills (García et al. 2016).

In their review of utilizing games in higher education, Vlachopoulos and Makri (2017) focus on the various positive impacts of games on students’ cognitive, behavioral, and teamwork skills. Teamwork learning outcomes contribute to students’ recognition of theoretical concepts and critical thinking; teamwork skills encompass the

development of social, emotional, and collaborative skills and refer, among other things, to student motivation and self-assessment. In fact, computer games have been considered as an influential means of learning teamwork skills (Huo, 2019). However, “there is a need to understand further how collaborative learning and use of games can enhance learning of teamwork skills in the context of higher education” (García et al. 2016, p. 36).

Gaming can be seen in relationship with learning and helping develop teamwork capabilities. Scientific research figured out that games can be a motivational factor in university students and enhance their motivation to learn. Furthermore, study concluded that gaming related learning was importantly more attractive to students than traditional learning. Moreover, computer-supported games have been known to provide important improvement in cooperation among subjects that involved in cooperation gaming activities. In addition, there are patterns in computer-based games that through creation and boosting of common ties create engagement and loyalty to the gaming community. Furthermore, games employed and designed to educate employees have displayed an important contribution to enhance in work engagement as well as decline in stress from work. Additionally, workers that where using games to train work situations found the gaming experience funny, engaging and positive. It can be concluded that gaming can boost teamwork, specifically in cooperation games or games which are centered around creating groups or societies. As a matter of fact, gaming can also increase learning experience and motivation. It can be concluded that exposing students to gaming as a form of teambuilding activity can enhance their communication and teamwork skills. (Lohmann et al. 2019).

## **Methodology**

The participants, data collection instruments and procedure are discussed as below.

### **Participants**

The participants in this study were 50 Iranian Air Force Freshman Cadets studying engineering majors (electronics, computer and aerospace) at Shahid Sattari Aeronautical University of Science and Technology. They were volunteered to participate in the study upon the researchers’ notice by playing video games at the multimedia center of the Faculty of Foreign Languages, therefore, no randomization was applied as for the criterion of their selection except for being a freshman. Moreover, the participants were all male with the age range of 18 to 20.

### **Instrumentation**

In order to conduct this study, the researchers utilized a phenomenological approach to data analysis. Therefore, they employed in-depth semi-structured interviews as well as observation and field notes to delve into the nature and essence of phenomenon under study, i.e. various aspects of teamwork through video games. The videogame used in the experiment was *Counter Terrorist* which is a 3D first person shooter game played in

the game center of Faculty of Foreign Languages at Shahid Sattari Aeronautical University of Science and Technology. Players can step into a world full of terrorists, make a blitz attack, secure a location, defuse a bomb or just rescue hostages. They can keep steady aim under heavy fire and strike out terrorists while grenades are exploding all around them or gun down their enemies using a variety of heavy weapons or even switch to butterfly knife. Throughout the game, the five players needed to work together to defeat a computer-controlled force. They made joint decisions on the strategies they used to defeat the enemy. Therefore, a key teamwork element learned by the cadets was that the fates of all players were interconnected; in order for the team to succeed, all had to cooperate and if one fails, this could lead to the failure of the whole team. In fact, the best path to success is for each player to think of both himself and the rest of the team.

### **Procedure**

The researchers, firstly, requested the volunteers to participate in this study by playing a Counter Terrorist Game. The volunteers who were all freshmen cadets studying engineering majors were randomly grouped into ten teams of five members (50 cadets). Each group played four rounds of the game in two consecutive days (each day two rounds) competitively against the computer. Each round lasted for 15-20 minutes. While they were playing the game, the researchers observed the players and employed field notes to record the instances of teamwork and team performance. After the second round (end of second day), the researchers utilized semi-structured in-depth interviews with the participants.

### **Results and Discussion**

Qualitative methods are concerned with studying human behavior within the context in which that behavior would take place naturally and in which the role of the researcher would not affect the normal behavior of the subjects. Moreover, the data are often collected by means of a number of procedures used simultaneously with one set of data leading to the next. The aims of these methods are, then, to present the data from the perspectives of the subjects or observed groups so that any form of biases from the researcher would not distort the collection, interpretation, or presentation of data.

Consequently, as stated by Lester (1999, p.1) “the purpose of the phenomenological approach is to illuminate the specific, to identify phenomena through how they are perceived by the actors in a situation. In the human sphere this normally translates into gathering deep information and perceptions through inductive, qualitative methods such as interviews, discussions and participant observation, and representing it from the perspective of the research participants. Phenomenology is concerned with the study of experience from the perspective of the individual, bracketing taken-for-granted assumptions and usual ways of perceiving”.

### **Investigating Research Question**

The research question addressed the aspects of learning teamwork via computer games.

Accordingly, the primary purpose of this study was to figure out the issues concerning teamwork achieved through game playing.

What comes next are the themes derived from the obtained data via the interviews, observations and field notes conducted in this study about the impact of computer games on acquiring teamwork skills.

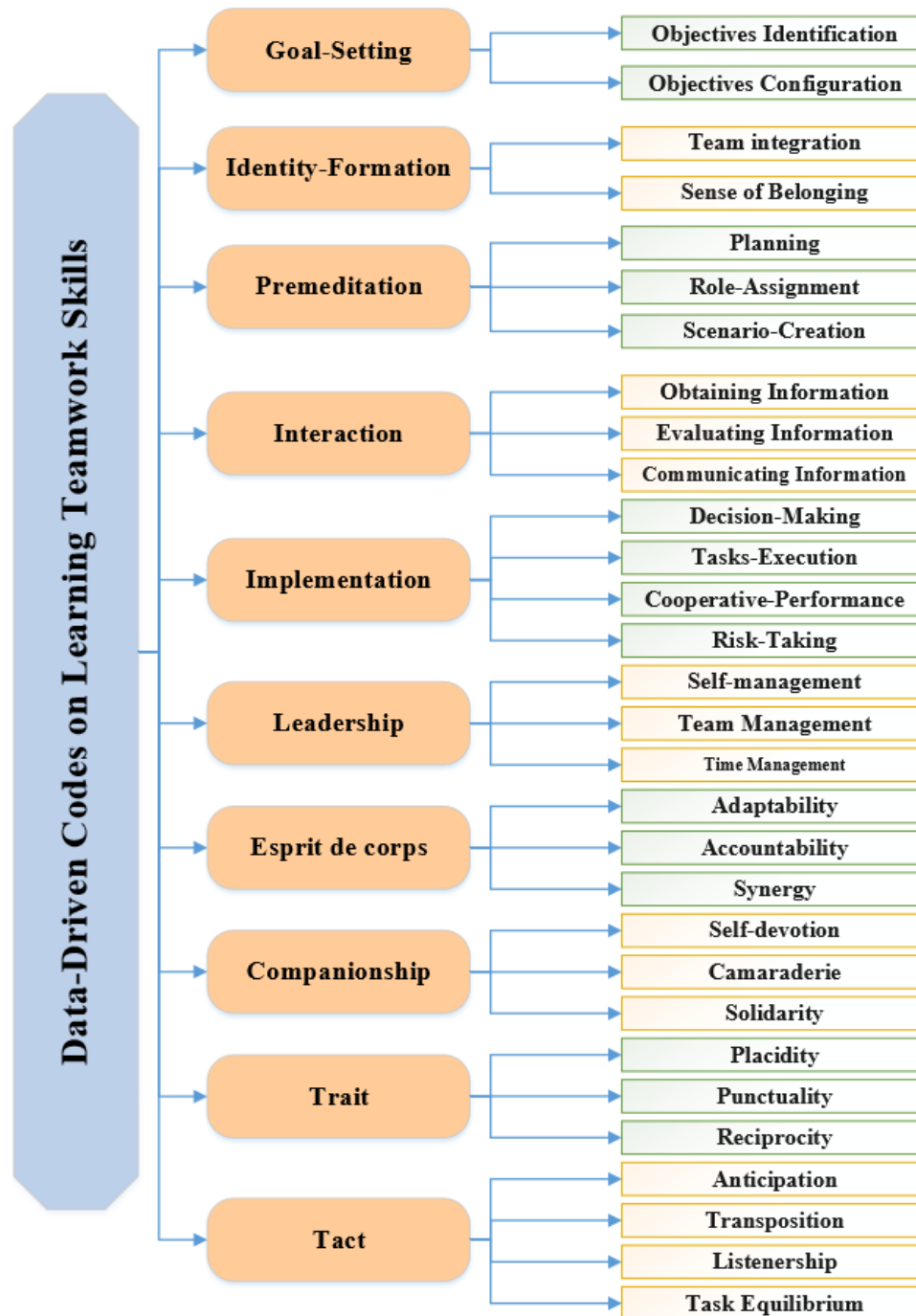


Figure 1. Data-Driven Codes on Learning Teamwork Skills

According to the obtained data, the themes can be grouped into 10 categories, each with its sub-themes, namely goal-setting, identity-formation, premeditation, interaction, implementation, leadership, esprit de corps, companionship, trait and tact. What comes next is the descriptive analysis of the above-mentioned data-driven codes.

### **1. Goal-Setting**

To guarantee success in each team, it is imperative to set particular goals to be achieved either individually by each of the team members or chorally by all members of the team. Therefore, students, while being observed, set specific goals in order to succeed in playing the game. To do so, they needed to first identify the objectives of the game and second to configure the objectives, i.e. to work on the arrangement and layout of the objectives to be achieved by the players and the team.

### **2. Identity-Formation**

One of the initial steps in creating the sense of teamwork among team members is to form a kind of shared identity around which all members can collaborate and cooperate. In fact, prior to the start of the game, the team members recognize their identity in the persona of a team. In other words, each individual incorporate himself into the team and as a matter of fact developed a sense of belonging to the community which in this case is the team.

### **3. Premeditation**

Players act upon a process of premeditation, i.e. the act of thinking about something and planning it before you actually do it. In other words, the players, thought chorally and collectively prior to any action or steps taken and planned in advanced. After doing a precise and to the point planning regarding the game, they also assigned the roles of the game in accordance with the plan and abilities to the players. Another phase in premeditation was to create a scenario for the whole team of what to do and what not to do in each steps of the game which can be viewed as the blueprint of the roadmap to achieve the goals in the game.

### **4. Interaction**

As the name speaks for itself, for any team activity to be successful, interaction is an inseparable part. In game playing, it was necessary for the players to interact in a number of ways. They needed to obtain the information from the game environment and also other players, then they had to evaluate the incoming information for the betterment of communication. Finally, they communicated the given information to boost the performance of the team, since the game was played on the basis of information exchanged within a fraction of a second.

### **5. Implementation**

To conduct all the planning, preparations, premeditations and scenarios, the players needed to make a decision either individually or in collaboration with the team members, i.e. they learned the process of decision-making as a member of a team and

for the team. When the decision on what to do had been made, the team members were to execute a particular task. By the same token, the players needed to implement the decision operationally. To this end, they also required to perform cooperatively with other members of the team to prevent chaos and parallelism. During the course of task-execution, however, there were instances that the players or the whole team required to take a risk, otherwise the team would be in jeopardy. Therefore, the players learned the concept of risk-taking in this regard.

### **6. Leadership**

Leadership is the ability to lead and guide a number of people in order to reach a specified level or achieve a pre-determined goal. In a teamwork process, this seems more exigent, i.e. to direct the members of a team in accordance with their ability towards reaching a goal. Accordingly, during the course of game playing the players not only strived to manage themselves which is technically referred to as self-management, but also they tried to manage the team. Concordantly, some of the players displayed more leadership qualities and, therefore, proceeded with team management, to lead other players and direct them in each step. They players also were to keep track of the time to have the best productivity and performance during the game and to manage the time efficiently and effectively.

### **7. Esprit de corps**

Esprit de corps or team spirit refers to the notion and sense of pride, care and support for each other, etc. that are shared by the members of a team. In the state of game playing, players learned to develop this characteristic as a critical aspect of teamwork, i.e. to put the common good above the individual good. In line with this conceptual framework, students adapted themselves with other players and teammates in order to enhance the level of cooperation. Therefore, adaptability was learned by the players in practice. Moreover, students learned to be responsible for the decisions made and the actions taken, i.e. their accountability towards the consequences of the issues occurred in the game. Lastly a point on this part is the synergy. Accordingly, students learned to increase the effectiveness of their actions and decisions by consulting other team members to boost the level of synergy.

### **8. Companionship**

While playing the game, students had a pleasant feeling of enjoying a friendly relationship with their teammates and that they are not alone. This genial atmosphere led the players to devote themselves to the team and to sacrifice for the teammates during the course of game playing. Furthermore, the camaraderie of the team, i.e. a feeling of friendship that existed within a team especially when they worked together was an influential factor that students learned and developed. Additionally, students demonstrated solidarity or loyalty and general agreement between all the members in a team because they all had shared feelings, opinions, aims, etc.



### 9. Trait

Students learned a number of particular qualities in their characters called traits while playing game with their team members, namely placidity, punctuality and reciprocity. In the state of placidity, students learned to be calm and peaceful and to control their wrath or overexcitement for better the team performance. Moreover, they mastered time management and punctuality. They needed to come to the game center on the time or the other team members had to start the game with fewer players as a penalty. They also learned to act in a timely manner. Last but not least, it is the situation in which two or more teammates provided the same aid, help, sacrifice, devotion and benefits to each other reciprocally.

### 10. Tact

Tact simply refers to the ability to be vigilant about your utterance or actions, so that you do not upset or embarrass other teammates. In order to reach this particular ability, the team members required to acquire or develop a number of features. First and foremost is the anticipation, i.e. to predict the future move of both your teammates and the opponent in the computer game. This prediction was a preemptive measure and was done to stop the opponent in the game taking action, especially action that would be harmful to the team. Another significant type of tact utilized by the students during game playing was transposition which is the ability to change the order or position of two or more things or players. The players shifted roles and also changed their weapons, strategies and positions in order to enhance the practice of teamwork. Listenership was also of great significance in the process of teamwork. Players learned to listen attentively and carefully to the teammates and also simultaneously to their leader in the game, otherwise they encountered potential consequences such as losing their lives or having casualties, etc. Last but not least, it is essential to concentrate on the issue of task equilibrium which is to distribute the tasks among various teammates that competed with the opponents in the game, so that it equalized the forces in a way to balance the capabilities of a team and players and that a situation was not likely to change suddenly.

**Table 1. Number and Percentage of Codes on the Teamwork Skills**

codes	number	percentage
Goal-setting	41	82
Identity-formation	35	70
Premeditation	32	64
Interaction	29	58
Implementation	25	50
Leadership	21	42
Esprit de corps	19	38
Companionship	17	34
Trait	17	34
Tact	16	32

What comes next is the tabulation of number and percentage of codes on the teamwork skills obtained from data collection instruments, namely semi-structured interviews with students, observation and field notes.

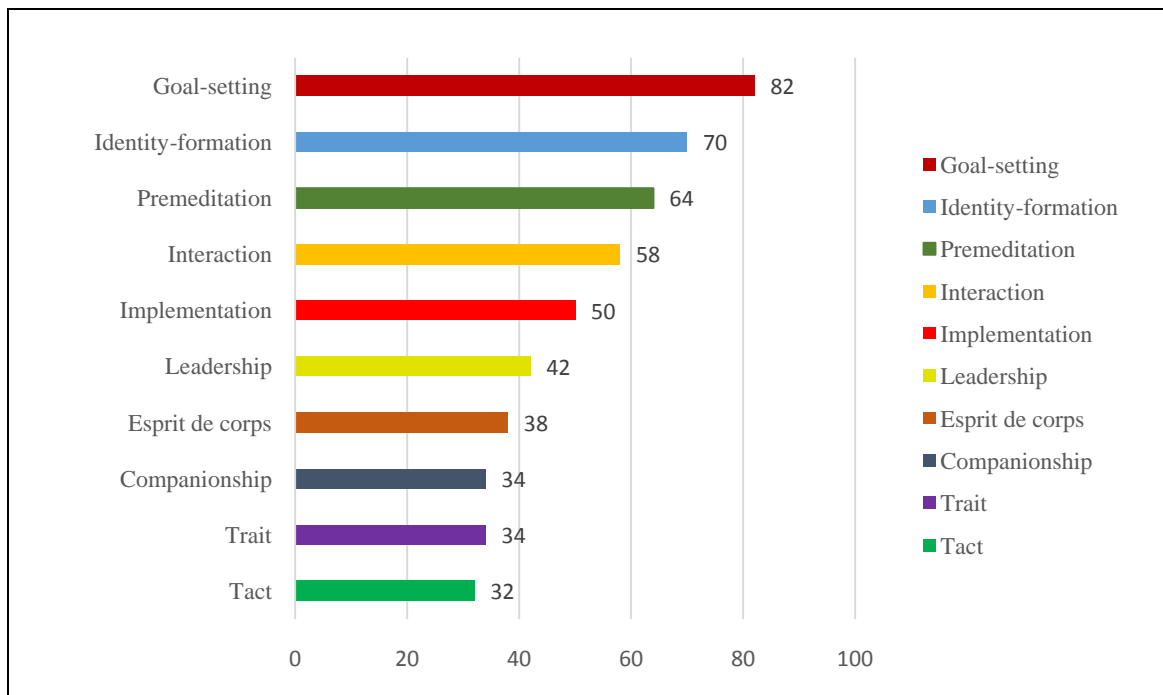


Figure 2. Percentage of Codes on the on the Teamwork Skills

This research aimed at investigating the phenomenon of computer games in enhancing the learning of teamwork. In other words, the main focus of this study was to examine the learning of teamwork via computer games. As stated previously, the main research question raised in this study was what teamwork skills can be learned by playing computer games. The findings of the research question revealed the teamwork aspects learned by students on ten main categories, namely goal-setting, identity-formation, premeditation, interaction, implementation, leadership, esprit de corps, companionship, trait and tact. Each category has also a number of sub-themes as displayed in Table 2.

A comparison can be made between the findings of this study and those conducted by Ewoldsen *et al.* (2012) which are relatively aligned with each other, in that, both regarded teamwork skills as a significant account to be taken into consideration about game playing. Ewoldsen asked participants to play Halo 2, a computer game that can be played either competitively or cooperatively. In addition, the results of this study revealed that students hold relatively similar views toward some specific items mentioned in the interview questions regarding the teamwork skills. Moreover, both studies approached positively towards teamwork aspects learned through playing video games.

The obtained findings of this research are also fairly compatible with those of the study performed by Cagaň, Papula and Kohnová (2021) which concentrated on the

effects of computer games as an instrument to improve remote team and collaboration experience. In their paper, they elaborated the impacts of Covid-19 pandemic in the world and the process of remote and distant working. In this regards, they examined the effects of game playing on the enhancement of cooperation and collaboration as well as teamwork and team performance of colleagues which revealed to be positive.

Furthermore, Gee's (2019) paper entitled "Are Video Games Good for Learning?" is partially in line with the present study in findings. In his paper, Gee elaborated on a number of aspects concerning dealing with the various effects of video games on learning including learning cooperation. He further opined that the simulation by means of a video game could pave the way for the action in the real situation.

Another similar study implemented by Jagad (2011) highlighted various vistas and angles of "Online Gaming and Teamwork". She aptly strived to investigate the relationship between playing multi-player online games and developing teamwork qualities and eventually found out that there existed a statistically significant relationship between the two variables.

In the same vein, another study conducted by Cela-Ranilla, Esteve-Mon, Esteve-González and Gisbert-Cervera (2014) revealed the impacts of using digital games in 3D simulations in developing self-management and teamwork. They posited that the new technologies including digital/video games can provide appropriate opportunities for planning and designing new learning environments and atmospheres through which new methods and strategies of learning can be implicitly or explicitly presented to students.

Lastly a word on discussion, the results of this study could be rendered as significant since it focused on the areas of teamwork enhancement and learning in that it is a vital feature of each organization. Moreover, it reflected the ideas of both the students (by means of interviews) and instructors (by utilizing observation and field notes) as the stakeholders of the educational system. Therefore, this study revealed the positive aspects of computer game playing on the enhancing and learning teamwork and team performance of students.

## **Conclusion**

According to the results obtained from the research question, there is a good number of issues to be dealt with concerning the impacts of computer games on the practice of learning teamwork skills by the students. In other words, by conducting this study, it was revealed that there are ten main themes or categories in the context of game playing that can potentially lead towards learning teamwork features. The themes are goal-setting, identity-formation, premeditation, interaction, implementation, leadership, esprit de corps, companionship, trait and tact. In each area, there is also a number of sub-categories elaborating various aspects of each theme. In goal setting, students learned to both identify and configure objectives to be reached during the course of game playing, i.e. to set goals and subsequently endeavor to achieve them. Students also formed a type of identity to be integrated into the team and develop the sense of

belonging by playing the game. Moreover, they mastered to plan, assign roles and create scenarios in the premeditation process. Interactivity and interaction encompasses obtaining, evaluating and communicating of information were learned by students via playing the game. They also acquired the required skills to make prompt decisions, execute tasks properly and efficiently, perform cooperatively and take necessary risks.

By the same token, another characteristic which students were taught inductively by playing game was the notion of leadership qualities. They learned to manage themselves, the team and the time. In addition, the team spirit in the forms of adaptability, accountability and synergy was also deeply recognized by the players. Companionship was still another area of teamwork skills that students figured out by enhancing the level of self-devotion, camaraderie and solidarity. Trait and tact were also learned and developed by the players. Traits such as placidity, punctuality and reciprocity and tact including anticipation, transposition, listenership and task equilibrium.

Therefore, as the findings of this research suggest, playing video/computer games can boost the teamwork skills of students in a number of issues as stated above.

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