EXPLORING LEADERSHIP PROFILES FROM COLLABORATIVE COMPUTER GAMING

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The purpose of this study is to examine if leadership styles can emerge in teams playing a strategic game in a computer gaming environment. The research questions are: 1) What leadership styles would emerge (if any) during the gaming session, and 2) What leadership styles (if any) could be exercised through playing the strategic computer game? In order to get a better understanding of what leadership styles would emerge during the gaming session, researchers observed students' interactions while they played a strategic computer game. The goal of this observation was to determine how many students (if any) would assume leadership roles. In the study, a group of Stanford University graduate students participated in the gaming session. The participants' task was to manage an estate company in small teams. There were three teams with three members on each team; teams competed against each other. Students developed goals, discussed problems, and tracked progress in order to win the game. Results showed that various leadership styles emerged during the gaming session. The leadership styles that emerged are described in the paper. In conclusion, the gaming environment served as a tool to exercise shared leadership.

The nature and quality of leadership is becoming more and more important in private and public organizations and in other activities in society. Leadership is an important social phenomenon that is mostly studied by researchers in management, the political sciences, and economics (Avolio, 2005; Bass & Riggio, 2006; Hermalin, 1998; Rotemberg & Saloner, 1993; Stegeman & Komai, 2004). These studies provide a rich theoretical framework for understanding the qualitatively different approaches to leadership. Contrastingly, not many studies have been conducted about the leadership phenomenon in education. The need to conduct more detailed studies of leadership-in-practice has long been recognized in both leadership studies and educational research (Bryman, 1996; Gronn & Ribbins, 1996), yet few studies have examined how to train leaders. Most studies regarding leadership training focus on transactional behaviors because they are easier to learn (Russell & Kuhnert, 1992). However, there is little research

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about opportunities and methods for training leadership skills. Leadership skills are extremely difficult, if not impossible, to teach by using traditional pedagogical methods such as lecturing. Furthermore, global organizations are expanding and work conditions are changing rapidly; thus, the methods of teaching leadership should change as well. Leadership in distributed and virtual organizations and in ad hoc expert teams (Engeström, Engeström, & Vähäaho, 1999) is creating new challenges for this training. New methods of teaching should focus on exercising and enhancing leadership skills in various formally organized and more spontaneous work conditions.

One solution for developing leadership styles could be to provide students with practical experience in leadership through playing strategic computer games in small teams. The aim of this study is to explore what kinds of leadership emerge spontaneously in teams playing a complex strategic computer game. This research study examines the learning of leadership skills in simulated environments. From an educational point of view, it is important to know how clearly visible emerging leadership styles are, how the spontaneously created styles reflect scholarly defined leadership styles, and how participants react to qualitatively different leadership styles.

Definition of Leadership and Leadership Styles

Despite the fact that numerous researchers and theorists have described the leadership phenomenon, there has been no consistent definition of leadership. Some definitions of leadership claim that it is a process of intentional influence by one person over others, as described by Yukl (1998): "to guide, structure, and facilitate activities and relationships in a group or organization" (p. 3). Because leadership is defined as an influencing process, it can also be exercised sideways, diagonally, and down-up throughout an organizational hierarchy (Hunt, 2004). Leadership is typically associated with more mystical, charismatic qualities such as the ability to influence, arouse, inspire, and transform (Bass & Avolio, 1994; Goleman, 2000). Furthermore, leadership is frequently theorized as the exercise of power, the setting of goals and objectives, the managing of cultures, and the mobilization of others to get work done (Alvesson & Sveningsson, 2003a; Gemmill & Oakley, 1992). In addition, leadership has been defined in terms of individual personality traits, leaders' behaviors, responses to leaders' behaviors, interpersonal exchange relationships, interaction patterns, role relationships, follower perceptions, task goals, organizational cultures, and the nature of work processes (Mello, 2003; Rost, 1991; Yukl, 1989). This study focused on four main leadership styles that have been discussed in recent research studies. The definitions and categories are as follows:

Transactional Leadership

This leadership style is characterized by the clear specification of what followers are expected to do (Bryman, 1996) and is based on a relationship of rational exchange between leader and subordinate (Bass, 1985; Howell & Costley, 2001). The leader articulates what behaviors are required and what will be rewarded and provides feedback to the subordinates about their behaviors. The subordinate, in turn, complies with these behavior requirements if rewards are desired (Yun, Cox, Sims, & Salam, 2007). Transactional leadership, in short, can be defined as a cost-benefit exchange between leaders and followers that occurs for the purpose of

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exchanging valued things. It is comprised of three dimensions: contingent rewards, active management by exception, and passive management by exception.

Transformational Leadership

Transformational leaders utilize behaviors such as charisma and intellectual stimulation to induce performance of subordinates beyond expectations (Yun et al., 2007). Bass (2000) stated that transformational leaders "move followers to go beyond their own self-interests for the good of their group, organization or community, country or society as a whole" (p. 21). The transformational leader leads by inspiring and stimulating followers and by creating highly motivating visions (Conger, Kanungo, & Menon, 2000; Kark, Shamir, & Chen, 2003). In summary, transformational leadership focuses on the relationship between leaders and followers that has an enduring moral purpose is grounded on the fundamental wants, needs, aspirations, and values of followers. Transformational leadership is comprised of the following dimensions: idealized influence, inspirational motivation, charismatic and intellectual stimulation, and individual consideration.

Heroic Leadership

Eicher (2006) stated that the heroic leader is characterized by the following: feels that her leadership is based on superior knowledge and information (omnipotence); fears failure more than anything (rightness); keeps up appearances at any cost including blaming others (face-saving); and views subordinates as inferior creatures in constant need of assistance and rescue (codependency). Two sub-classes can be distinguished within heroic leadership: autocratic and coercive leadership styles, which have many similarities. The autocratic leader sequesters a high degree of control without much freedom or participation of members in group decisions. The autocratic leader determines all policies, techniques, and activity steps and dictates the particular work tasks and work companions of each member. Furthermore, the autocratic leader tends to be personal in her praise and criticism of the work of each member, but remains aloof from active group participation (Choi, 2007). On the other hand, a coercive leader demands immediate compliance and drive to achieve, initiative, and maintain self-control (Goleman, 2000).

Post-Heroic Leadership

Bradford & Cohen (1998) and Eicher (2006) stated that post-heroic leadership takes place when the leader wants others to take responsibility and gain knowledge (empowerment), encourages innovation and participation even in ambiguous situations (risk-taking), seeks input and aims for consensus in decision-making (participation), and wants others to grow and learn even at the expense of becoming dispensable herself (development). Post-heroic leadership has thus become a concept used to describe a new conceptualization of leadership that refutes the top-down focus on the leader typical of most leadership literature and discourse (Fletcher, 2004). This leadership style is well-suited to complex, changing, and inter-dependent environments. In summary, post-heroic leadership emphasizes shared responsibility and mutual influence. The two sub-classes in post-heroic leadership, democratic and shared leadership, are used in this study.

Democratic leadership. In democratic leadership style, group participation, discussion, and group decisions are encouraged by the leader. Democratic leaders build consensus through

ISSN 1554-3145

participation, and they share leadership to some degree with their team members. By giving team members a voice in decisions, democratic leaders build organizational flexibility and responsibility and help generate fresh ideas. By listening to team members' opinions, the democratic leader learns what decision to make. In addition, because team members have a say in setting their goals and the standards for evaluating success, they tend to be very realistic about what can and cannot be accomplished (Goleman, 2000).

Shared leadership. Shared leadership occurs when all members of a team are fully engaged in the leadership of the team and are not hesitant to influence and guide their fellow team members in an effort to maximize the potential of the team as a whole (Pearce, 2004). It could be defined as an emergent team property that results from the distribution of leadership influence across multiple team members. Specifically, it is a dynamic, interactive influence process among individuals in groups where leadership is broadly distributed among a set of individuals instead of centralized in the hands of a single individual who acts in the role of a superior (Pearce & Conger, 2003). In summary, shared leadership is a distributed phenomenon in which there can be several (formally appointed and/or emergent) leaders (Mehra, Smith, Dixon, & Robertson, 2006).

Leadership Learning and Simulation Gaming

Leadership development is a process in which capacities are built in anticipation of unforeseen challenges and complex skills are acquired. It is difficult to develop leadership skills using traditional pedagogical methods (e.g., lectures) because there is no precise definition of leadership and knowledge of leadership theories is not sufficient. In addition, leadership is a complex and ill-defined practice in which varying situational issues play an important role. Thus, mere knowledge about principles of leadership and some prototypical models with which to apply these principles do not lead to successful leadership practices in varying situations.

Complex learning environments such as simulations and computer games may help acquire ill-defined skills (Sterman, 2001; Zack, 1998; Burgess, 1995). Simulations and computer games present an enormous amount of complex operations where a leader of a team is needed to make the final decision in order to lead the team to victory. These environments can engage participants in complex thinking about learning topics which can lead to better comprehension of the topics at hand and the development of useful learning skills (Jonassen, 2000). In addition, computer games, with many complex decisions to make, connect the players to everyday life experiences (Barab, Hay, & Duffy, 2000; Goldman et al., 1996). Such concrete experiences are the heart of the experiential learning approach in which knowledge is constructed, not transmitted, as a result of experiencing and interacting with the environment (Kebritchi & Hirumi, 2008). Participants explore, experiment, construct, converse, and reflect on what they are doing, and so in that way learn from their experiences (Jonassen, Peck, & Wilson, 1999). Furthermore, in this gaming environment, participants collaborate in small teams in order to win the game, and group work helps them to share and develop alternative viewpoints. Thus, learning in this environment is not the lonely act of an individual but a matter of being initiated into the practices of a community (Lave & Wenger, 1991). In summary, a technology-based environment aims to promote dialogue and reflexivity among group members (Lainema & Nurmi, 2006).

The popularity of computer games for education and training came about in the 1970s and 1980s. Nowadays, many studies are examining the potential for game application to learning

ISSN 1554-3145

(e.g., Gredler 2003; Prensky 2001; Rieber 1996). For example, computer games are hypothesized to provide multiple benefits, such as:

- Motivation for learning (Amory, Naicker, Vincent, & Adams, 1999; Gander, 2002; Ricci, Salas, & Cannon-Bowers, 1996);
- Complex approaches to learning processes and outcomes (McFarlane, Sparrowhawk, & Heald, 2002; Sterman, 2001; Zack, 1998);
- Active-learning techniques (Oblinger, 2004).

However, in spite of a growing body of literature highlighting the educational potential of computer games, the empirical evidence to support this assumption is still limited and contradictory, particularly regarding the effectiveness of games for concrete educational purposes (Mitchell & Savill-Smith, 2000; Vogel et al., 2006). In addition, recent scientific literature is very limited regarding the training effectiveness of gaming technology in training and education for adults in both civilian and military sectors (Day, Zaccaro, & Halpin, 2004). Therefore, it is essential to examine the outcomes of using simulation games for learning. In particular, it is worth studying whether games could provide a fruitful way to exercise practical skills needed in the workplace such as leadership skills.

It is widely agreed upon by leadership scholars that leadership can be taught (Bass & Avolio, 1994). Some examples of using simulation games to develop leadership skills can be found in the military sector (O'Neil & Fisher, 2004). The military sector also uses simulation-based games in flight and combat training (O'Neil & Andrews, 2000). One example is the leadership simulation that uses computer game technology to train U.S. Special Forces soldiers in skills like adaptive thinking, negotiation, conflict resolution, and leadership (Hunsaker, 2007). In addition, simulations have been used for examining leadership behavior and performance (Hunter, Bedell-Avers, & Mumford, 2009) and comparisons of leadership types (e.g., individual, dyadic, group) (Dionne & Dionne, 2008), but little research indicates the development and exercise of leadership skills through simulations or computer games. More research has been conducted with regard to teaching strategic management through business games (Barlas & Diker, 2000; Knotts & Keys, 1997; Lainema & Hilmola, 2005; Lainema & Nurmi, 2006; Wolfe, 1997). However, it has to be noted that there are several key differences between management and leadership. The main difference is that leadership roles refer to those that come with and without formal authority, whereas management development focuses on performance in formal managerial roles (Day, 1999). Thus, training in developing leadership and management skills has to be distinguished.

Large-scale leadership simulations were used in the 1990s for training leaders in corporations like *Looking Glass, Inc.* (simulates a glass manufacturing company), *Globalcorp* (diversified international conglomerate), and *Metrobank* (simulates a diverse array of business activities). A more recent example of a computer simulation for developing leadership skills is *Virtual Leader* (Aldrich, 2004). *Virtual Leader* simulates a business meeting and requires the players to perform a number of social interaction tasks (e.g., introduce ideas) with other computer-generated characters in order to be an effective leader. Unfortunately, there is limited evidence as to the training effectiveness of the aforementioned simulation games for adult learning. There is a need for research on the application of simulation games in leadership training. According to Hunsaker (2007), there are several ways that simulations can facilitate the development of effective leadership behavior. One of them involves participants learning from

ISSN 1554-3145

peer feedback during the decision-making process as they perform the functions of decision-makers and leaders. Furthermore, learning to lead involves dealing with complexity, taking risks, and collaborating with others to bring a myriad of talents to bear on critical issues (Dentico, 1999).

Methods

The research questions of the study are: 1) What leadership styles would emerge (if any) during the strategic computer gaming session, and 2) What leadership styles (if any) could be exercised by playing the strategic computer game?

Participants

Nine randomly selected participants took part in the study (two females and seven males). They were Stanford University graduate students from different academic backgrounds, such as engineering and humanities. The participants in the teams did not know each other. There were three teams with three participants on each team. On one team, there were only male students, and two other teams each had one female student. Participants did not consider themselves experienced users of computer games. They considered their level of experience with strategic computer gaming as basic, and none of them had played the game used for the study before. The study was their first time participating in such a gaming session. During the experiment, participants worked together in teams because only in teams could leaders be distinguished. They were not told the purpose of the study. Their goal was to win the game, but no leadership roles or tasks were assigned to them. The three teams competed against each other for one hour. Final scores of the game determined which team won. Due to the game's limited time, the participants became focused during the gaming session and were thoroughly engaged and immersed in the game. The time pressure increased the speed of their decision-making. The gaming session took place at Stanford University, California, USA in the autumn semester of 2007.

Description of the Game and Setting

In the study, a commercial, strategic computer game called "Build-a-lot" was used, where players were real estate moguls whose task was to take over the housing market and to build, upgrade, sell and buy houses for huge profits. The purpose of the competition was to win the game; the team with the most profits and the highest achieved level won the game. The objective of the game was to get the net value to the highest possible number by building, upgrading, and selling properties. If the players managed to get every operation correct, they passed their current level in the game and advanced to the next level. If a team failed a level in the game, they had to repeat that level from the beginning. During the game, players received instructions from the fictional mayor of the city in which they were building houses. To construct a property, players must have the blueprint, a certain number of workers, and enough materials. The players' task was to move from one town to another to improve them and achieve all the goals in a given period of time. They were asked to build different kinds of houses and buildings, earn a specific rental income, or earn cash. To achieve these goals, players had to choose exactly what they had to build and demolish, which requires certain calculations. Players could build the following

ISSN 1554-3145

kinds of houses: Rambler, Colonial, Tudor, Estate, Mansion, or Castle. They could also build a number of public buildings, such as a Post office, Library, Workshop, Bank, or Sawmill.

The main advantage of this game was the fact that it made players think and calculate items (for example, taxes that they should pay) in order to win. The game provided the participants with the possibility to face real-life work related problems and develop ways to solve them. It enhanced teams' interactions as they had to communicate in order to make the right decisions. The game session was an intensive, competition based environment where time pressure was involved, and the participants had to make well-timed decisions in order to manage their estate company in the game. The computer game presented an enormous amount of complex operations which a team leader needed to address the final decision in order to lead the team to victory. The speed of the game was fast, and only quick decision-making could lead the teams to win the game. This gaming environment was interactive, and participants interacted by solving the given tasks in the game. Therefore, strategy and appropriate leadership techniques were needed in order to be successful. Furthermore, the training was competition-based and thus required implementation of leadership skills as well.

The room setting could be described as having tables laid out to form one big square table in the middle of the room. Teams 1 and 2 sat opposite to each other while Team 3 sat in front of the window, with Team 1 on its left side and Team 2 on its right side. No team could see the other teams' computer screens. Every team had one notebook computer to use along with a computer mouse. Researchers who observed the teams introduced the game to participants at the beginning and told them that they could look for help and instructions in the "Tutorial" section of the game but could not ask the observing researchers any questions. Team members could ask questions of other teams.

Observations

With the purpose of understanding which leadership profiles could be distinguished during collaborative computer gaming, three researchers observed students' interactions when they were playing the strategic computer game. The aim of the researchers was to observe students' behavior and take detailed notes of all student dialogue and actions. They observed students' interactions while playing the game (how they collaborated, how they made decisions, etc.); each researcher had one team to observe. The researchers had no prior knowledge of the leadership styles' characteristics, and they did not look for specific leadership style profiles in students' behaviors during the observation. The participants were not assigned any leadership roles, and the researchers observed their "freestyle" gaming. The goal of the observation was to determine if students would take on leadership roles during the gaming session. The observation method has been conducted in several leadership styles studies, such as Mouly and Sankaran (1999), Scribner, Cockrell, Cockrell, and Valentine (1999), and Youngs and King (2002). Observation is part of ethnographic research and leads to a description of people, events, and/or cultures; it is a holistic approach concerning the observation of "everyday" events and the description and construction of meaning, rather than reproduction of events (Robson, 1993). It is an objective method as it does not rely on participants' opinions, which is a limitation of interviews and questionnaires.

After the game session, a literature review was conducted related to the leadership concepts and leadership styles' characteristics. For the purpose of data analysis, detailed codes were developed that described each leadership style's characteristics. Based on the literature

ISSN 1554-3145

review, the following leadership style categories were distinguished: transactional, heroic (autocratic, coercive), transformational, and post-heroic (shared, democratic) leadership. These categories of leadership styles (each had subcategories referring to the given leadership style's characteristics) were used to analyze the transcripts of notes. All notes made during the observation were transcribed verbatim. After reading through the transcripts of notes, the transcripts were coded in terms of the four leadership styles: transactional, transformational, heroic, and post-heroic leadership. The first author of the study completed the coding first, and afterward an additional person was asked to review the codes. For the data analysis of the transcribed notes, content analysis was used (Insch, Moore, & Murphy, 1997). Such analyses of written text were used in a few leadership studies—for example, in Shamir, Arthur, and House (1994), Den Hartog and Verburg (1997), Alvesson and Sveningsson (2003b). The leadership styles categorization is presented in Table 1.

Results

Various leadership styles emerged in teams during the gaming session. The following section describes each team's leadership style.

Team 1

Team 1's leadership styles could be described as a transformational leadership style and also as a traditional, heroic leadership style. The leader of this team tried to inspire his team members and was concerned about his team members' opinions. He did not give specific orders to his team members but instead he asked for their preferred operations in the game.
The leader possessed "superior" knowledge, and all wisdom was concentrated in him. He knew what actions to take during the game, although he had not played that game before.
The dialog below is an example of participant B, the leader's perceived omnipotence:

Participant A: "Do we need to train (workers)?"
Participant B: *"Yes, but it is too expensive."* (He is upgrading houses.)
Participant A: "How about (if) we build this one?"
Participant B: *"Maybe not... we have to make more money."*

Participant B knew what to do in this situation, and he determined his teammates' opinions to be less valuable at this point. He possessed the skills of assertiveness, advocacy, and domination, which are significant elements of the heroic leadership style. Even though participant A's opinions were turned down by the teams' leader, he agreed with the leader without insisting on his opinions and without trying to persuade the others that he was right. This could suggest that participant B was respected for his knowledge and decision-making style. The following dialog could suggest that as well:

Participant A: "We should get more workers."
Participant B: "But we need lots of cash. *Do you think workers are a good investment?"*
Participant C: "Ya!" (Participant A nods.)
Participant A to Participant B: "*Thank you.* You keep earning money."

ISSN 1554-3145

Table 1
Leadership Styles Categorization

1. Transactional leadership style	1. Transformational leadership style
• cost-benefit exchange between leaders and their followers • contingent rewards • active management by exception	• inspiring and stimulating followers • idealized influence • inspirational motivation • intellectual stimulation • individual consideration
2. Heroic leadership style	**2. Post-heroic leadership style**
• omnipotence • rightness • face-saving • codependency	• empowerment of members • risk taking • participation • development of members
A). Autocratic leadership	**A). Shared leadership**
• high degree of control • leader determines all policies, activity steps and work tasks – gives orders • no active group participation, leader mostly makes decisions alone	• mutual influence - dispersed leadership role • members participate in the decision-making process • members fulfill tasks traditionally reserved for a hierarchical leader • members offer guidance to others to achieve group goals
B). Coercive leadership	**B). Democratic leadership**
• leader demands immediate compliance to his orders • leader dictates each step taken • drive to achieve, initiative, self-control	• leader encourages group decisions participation and discussion • leader builds consensus through participation • leader shares leadership to some degree with members • leader builds organizational flexibility

In the dialog, one team member expressed appreciation for the leader's decisions. Team members were content that their leader made effective decisions. This team's leadership style could be described as democratic also. During the competition, participant B, who controlled the mouse, read aloud game instructions and tried to generalize the guidelines for the team. There were several times when two other team members brought up questions, and he answered them quickly. Although he controlled the mouse during the whole process, he often asked his team members' opinions before implementing ideas. Group participation and discussion was

ISSN 1554-3145

encouraged by him. He possessed the role of leader during the whole gaming session, and he was accepted by his team members as an official leader of the team. The leader was transformational in his behavior, and he valued his team members' opinions. Below is an example:

> Participant B: *"Do you want a workshop?"* Then, he explains, "the strategy of this level is to build a house and get cash, and you need to build a library"
> Participant C: "We need more training."
> Participant B: "Oh, mail! That's good." (He opens the mail; team members look at the screen.)
> Participant B: *"How do you feel about an upgrade?"*

From this team observation, it could be noted that participant B asked for his teammates' opinions because he wanted to encourage his teammates to share their ideas and actively involve them in the gaming session. Thus, the leadership style present in this team could be interpreted as shared leadership. The leader shared leadership to some degree with team members; he asked them what they think should be done next and waited for their agreement to proceed further. Team members participated in making some of the decisions, such as what to do next, but they depended on their leader to make the final decision. In this team, participant B was often asking team members for opinions (although not all of their ideas were adopted and implemented) that helped him to lead the team to win the game. In conclusion, effective leaders favor participation but also know when they need to be directive or make decisions on their own.

Overall, there was no conflict in this team during the gaming session. Everyone seemed to be content with the decisions participant B made, and the atmosphere of the team was harmonious. The leadership techniques used by the leader brought success to the team, and this team won the game; they had the highest score and passed the highest level in the game at the end of the gaming session.

Team 2

Team 2's leadership style could be described as an autocratic leadership style. The disagreements in this team came from the fact that one participant wanted to dominate and was pushing other team members to realize his ideas. It could be noted from observations of this team that he was behaving like an autocratic leader. He issued orders, and he expected them to be followed without questions. He wanted to determine all activity tasks and steps. A high degree of control is the main characteristic of the autocratic leadership style.

The example of participant D's autocratic leadership style can be noted in the dialog below:

> (The team ordered materials and had a new task in the game to perform.)
> Participant E: "What should we do?"
> Participant D: *"We buy houses later, buy one Tudor, we can sell it later."*
> Participant F: "Colonial first." (He meant Colonial buildings.)
> Participant D: "No, definitively don't do it, buy Tudor. Better to build the Tudor. *Listen to me!*" (Participant F was against that.)
> Participant D: *"Sell a Tudor and buy this one of a higher price, listen to me!*"

ISSN 1554-3145

Participant D was focused on winning the game and concentrated on operations that needed to be done in the game rather than on his team members' opinions.

In addition, a coercive leadership style could be noted from his behaviors as he demanded immediate compliance. When participant D was behaving like a demanding leader and gave orders to team members, they did not appreciate it and they were willing to collaborate with each other more but not with participant D. He wanted to dominate most of the time during the gaming session, but he was not accepted by the other team members as an official leader of this team. On the contrary, a shared leadership style could be noticed in the observation of this team also. There were highlights of mutual influence between the team members. In particular, the female participant was asking two other members' opinions and encouraged them to exchange ideas. She had the computer mouse in her hand during the game's competition, and she was trying to discuss with others all ideas she was about to implement. The two other participants were expressing their opinions to her, and she was implementing what she had been told to do. In general, all team members tried their best to win the game, and ideas were coming from every team member. They always tried to help each other by expressing opinions and comments.

The following is a note from the observations showing highlights of shared leadership style and mutual influence in this team.

Participant D: "Let's hire a worker."
Participant F: "We don't have enough money."
Participant E: "We have to repair (house) first." Then she added: "Which one?"
Participant F: "We don't have enough materials."
Participant D: "How much do we need?"
(Participant E answered how much they need and she ordered some materials)

Based on the results of the study, the mix of leadership styles implemented in this team did not lead the team to be successful or to achieve high performance. Team 2's game score and the achieved level in the game was second (after Team 1); perhaps this was due to one participant's autocratic and coercive leadership style, which was not effectively implemented within the team. In addition, team members were not content with participant D's dominant influence.

Team 3

In Team 3, no clear leadership style could be distinguished during the gaming session, and nobody in this team wanted to have or took on leadership responsibility. It can be noted from this team observation that there was an absence of leadership. Leadership involves influence, and without influence leadership does not exist. No member of this team had a personality with which to influence others. This team's game score was the lowest, meaning they lost the game competition.

The note from the observation below is an example of Team 3's lack of strategy:

(Team members were given a new task to perform after they passed task 1, and they were reading the instructions for the next task.)

ISSN 1554-3145

Participant H: "We have to build it. How many do we have to build? 75? We're out of materials. So what's next? Do we have additional instructions? Or just make more money?"
Participant G: "We keep making money."
Participant H: "Our strategy is to make money, right?"

In this team, no one wanted to be responsible and everyone was making suggestions. Furthermore, nobody's opinion was respected or considered to be important. This team usually made a decision based on a situation rather than a person. This team's way of playing the game lacked a clearly distinguished leadership style; however, highlights of collaboration and shared leadership could be noted in the team's conversations. Below is a note from the observations showing highlights of shared leadership style, mutual influence, and collaboration in this team:

Participants H: "We don't have money."
Participant G: "Do you want to sell it?" (He used his finger to point to the monitor.)
Participants H: "This is the only one we can sell. We need land."
Participant G: "Buy the house."
Participants H: "Upgrade. We've no money."
Participant G: "We have to buy the house. Raise income…"

During the game, participants G and H were making suggestions about what to do next and exchanged their opinions frequently; participant I was silent, but he still contributed to the team. He did not actively exchange ideas, but rather reminded his teammates of important information by pointing it out on the computer screen.

At the beginning of the game session, one of the participants automatically took over the computer mouse and controlled it until the game session ended. Although he was "in charge of the mouse," he did not make decisions on his own; he asked teammates for their opinions before taking action. Once during the game he asked his teammates if any of them wanted to try to control the mouse, but none of them took over the mouse from him. He tried to organize the structure of the team also, suggesting that each of them should be in charge of one job. However, other team members did not consider that to be necessary. This might indicate that the team members were satisfied with the current situation and simply viewed the division of roles as not important.

This team's behavior could be described as passive/avoidant behavior. They did not respond to situations and problems systematically. Such "passive leaders" avoid specifying agreements, clarifying expectations, and providing goals and standards to be achieved by followers. This style has a negative effect on desired outcomes and has negative impacts on followers. Passive leadership often occurs when there is an absence or avoidance of leadership. Decisions are delayed and no attempt is made to motivate followers or to recognize and satisfy their needs. Therefore, the lack of a leadership role in this team probably caused them to lose the game and have the lowest score.

Discussion

The main concern of this study was whether clearly visible leadership styles would emerge in teams playing a strategic computer game. The results of the study showed that while

ISSN 1554-3145

playing the game, various kinds of interactions emerged in all teams and all team members were engaged in the gaming session. However, there were substantial differences between teams.

In Team 1, transformational, heroic, shared, and democratic leadership styles were distinguished. Based on the effectiveness of Team 1, it could be noted that the best leaders do not just use one style of leadership—they are skilled at several and have the flexibility to switch between styles as circumstances dictate (Goleman, 2000). In Team 1, the role of the heroic leader was implemented with shared and democratic leadership styles that made a positive impact on the team's performance. This gaming experience may have taught team members which leadership style would be effective to use in the future when placed in a similar situation.

On the contrary, in Team 2, shared leadership combined with autocratic and coercive leadership styles did not bring effective results. The demanding attitude of Team 2's leader towards other team members had a negative influence on team effectiveness. He wanted to direct and control all decisions without any meaningful participation by the other team members, which they did not appreciate. The gaming experience may have taught the other team members that this leadership style would not be effective to use in the future when they are placed in a similar situation. Although highlights of shared leadership could be noticed in Team 2, it did not help them to win the game.

In Team 3, there was no clearly distinguished leadership style; this team had the lowest score in the game. In general, team members want to have their leaders direct, inform, or give feedback. Thus, when the team has no leader, the team's potential is hindered and there is no organization, but rather chaos. Team members in Team 3 demonstrated a failure to take responsibility for managing and decision-making, and no one in this team provided direction or support. This "non-leadership" style could be compared to "laissez-faire," a principle which emphasizes independence. In this leadership style, team members are left alone to do their work with little direction or supervision. The conclusion from these results is that leadership is needed for successful team performance.

The second question considered in this study was which leadership style spontaneously emerged in all teams during the game session? And thus, what leadership style could be exercised by using this kind of non-guided computer gaming based team process? As a result of the study, shared leadership styles emerged in all teams during the game session; therefore, it could be stated that playing a computer game in small teams without any predefined leadership roles could provide the tools to develop shared leadership. Shared leadership is a complex process and is frequently used in organizational expert teams. More organizations increasingly embrace groups and teams as basic building blocks of their business operations and strategy executions (Cohen & Bailey, 1997); thus, leadership training techniques should shift their focus from individual to group-level leadership trainings.

Furthermore, few studies have shown that shared leadership is a stronger predictor of team performance than vertical leadership (Pearce & Sims, 2002; Pearce, Yoo, & Alavi, 2004; Ensley, Hmielski, & Pearce, 2006). Research indicates that poor-performing teams tend to be dominated by the team leader, while high-performing teams display more dispersed leadership patterns, or shared leadership (Pearce, 2004). These findings support the notion that shared leadership may result in greater effectiveness than the emergence of a single internal team leader, making it crucial to train shared leadership in order for the teams to be more effective and efficient. Moreover, the heroic leadership style is hardly used alone in today's organizations. One leader is not enough to manage all situations in complex environments. It is becoming more difficult for any one person to be an expert in all aspects of the work that needs to be done and

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possess all information necessary to solve problems. One approach to exercise shared leadership could be to play a strategic computer game in small teams. Participants could be trained to be better leaders through computer gaming and computer gaming sessions could help them to develop strategies on how to be more successful.

In summary, classes based on organizing game sessions with strategic computer games have two advantages. First, students may experience how the competition and time pressure situations influence their behavior. Second, they see which team wins the game, attempt to interpret the game results, and come to conclusions as to why their team performance was not effective if their team lost. This gaming experience may teach students how to behave better in certain situations. After the gaming session, participants will learn which type of leadership style works well and how to behave when placed in a similar situation. Based on the results of this study, it can be concluded that playing a strategic computer game in teams of three could provide tools to apply different leadership styles and could be used for practicing shared leadership.

However, two limitations of the study's implementation should be mentioned. First, the length of the computer game session was short; and second, a small number of players participated in the gaming session. Therefore, it would be fruitful to organize leadership training sessions in which more participants will take part and the gaming sessions will last longer. For future areas of inquiry, it would be interesting to organize an explicit leadership training session with a strategic computer game. Researchers might arrange a game session in which chosen participants are assigned the role of the leaders and are given the task to manage their teams. In this way, it would be possible to evaluate the game environment as a tool for leadership training. It would also be beneficial for the game participants to conduct interviews with them after the training and evaluate the leadership styles they experienced. This kind of debriefing could help participants to articulate what they have learned for the purpose of knowledge building (Jonassen et al., 1999).

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ISSN 1554-3145

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