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Playing to Learn: Business Simulation Games as Leadership Learning Environments

by

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ABSTRACT

The aim of this dissertation is to investigate if participation in business simulation gaming sessions can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills. Particularly, the focus is to describe the development of leadership styles when leading virtual teams in computer-supported collaborative game settings and to identify the outcomes of using computer simulation games as leadership training tools.

To answer to the objectives of the study, three empirical experiments were conducted to explore if participation in business simulation gaming sessions (*Study I and II*), which integrate face-to-face and virtual communication (*Study III and IV*), can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills. In the first experiment, a group of multicultural graduate business students ($N=41$) participated in gaming sessions with a computerized business simulation game (*Study III*). In the second experiment, a group of graduate students ($N=9$) participated in the training with a 'real estate' computer game (*Study I and II*). In the third experiment, a business simulation gaming session was organized for graduate students group ($N=26$) and the participants played the simulation game in virtual teams, which were organizationally and geographically dispersed but connected via technology (*Study IV*). Each team in all experiments had three to four students and students were between 22 and 25 years old. The business computer games used for the empirical experiments presented an enormous number of complex operations in which a team leader needed to make the final decisions involved in leading the team to win the game. These gaming environments were interactive; participants interacted by solving the given tasks in the game. Thus, strategy and appropriate leadership were needed to be successful. The training was competition-based and required implementation of leadership skills.

The data of these studies consist of observations, participants' reflective essays written after the gaming sessions, pre- and post-tests questionnaires and participants' answers to open-ended questions. Participants' interactions and collaboration were observed when they played the computer games. The transcripts of notes from observations and students dialogs were coded in terms of transactional, transformational, heroic and post-heroic leadership styles. For the data analysis of the transcribed notes from observations, content analysis and discourse analysis was implemented. The Multifactor Leadership Questionnaire (MLQ) was also utilized in the study to measure transformational and transactional leadership styles; in addition, quantitative (one-way repeated measures ANOVA) and qualitative data analyses have been performed.

The results of this study indicate that in the business simulation gaming environment, certain leadership characteristics emerged spontaneously. Experiences about leadership varied between the teams and were dependent on the role individual students had in their team.

These four studies showed that simulation gaming environment has the potential to be used in higher education to exercise the leadership styles relevant in real-world work contexts. Further, the study indicated that given debriefing sessions, the simulation game context has much potential to benefit learning. The participants who showed interest in leadership roles were given the opportunity of developing leadership skills in practice.

The study also provides evidence of unpredictable situations that participants can experience and learn from during the gaming sessions. The study illustrates the complex nature of experiences from the gaming environments and the need for the team leader and role divisions during the gaming sessions. It could be concluded that the experience of simulation game training illustrated the complexity of real life situations and provided participants with the challenges of virtual leadership experiences and the difficulties of using leadership styles in practice. As a result, the study offers playing computer simulation games in small teams as one way to exercise leadership styles in practice.

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LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following articles, which are referred to in the text by their Roman numerals:

- I Siewiorek, A., & Lehtinen, E. (2011). Exploring leadership profiles from collaborative computer gaming. *International Journal of Leadership Studies*, 6(3), 357–374.
- II Siewiorek, A., & Gegenfurtner, A. (2010). Leading to win: The influence of leadership style on team performance during a computer game training. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the disciplines: ICLS2010 proceedings* (Vol. 1, pp. 524–531). Chicago, IL: International Society of the Learning Sciences.
- III Siewiorek, A., Saarinen, E., Lainema, T., & Lehtinen, E. (2012). Learning leadership skills in a simulated business environment. *Computers & Education*, 58, 121–135.
- IV Siewiorek, A., Gegenfurtner, A., Lainema, T., Saarinen, E., & Lehtinen, E. (Submitted). The effects of computer-simulation game training on participants' opinions on leadership styles.

1. INTRODUCTION

Developing high-level competencies among university students is a challenging task. Students must develop a wide range of higher-order thinking, problem solving and cognitive skills to be able to manage effectively at their future work places. The global economy is changing rapidly; the ability to be skilful, flexible and adaptable is a requirement to be successful. However, the diverse methods and tools commonly used for teaching business skills at higher educational institutions are insufficient to cope with the complexity of organizations and unstable conditions of today's market (Achtenhagen et al., 1993; Baker & O'Neil, 2002; Lehtinen, 2002; Machuca, 2000). Consequently, the way of educating students must change in order to fulfil these requirements and new methods of teaching leadership and other practical skills should be implemented.

One method of preparing students to better cope with business world complexity could be incorporating computer simulation games into their lectures. The simulation gaming environments could help students practice leading, managing unpredictable situations and solving problems. Previous studies have indicated that for the purpose of learning, 'real life' company operations complex learning environments are required (Burgess, 1995; Sterman, 2001; Zack, 1998).

Nowadays, more and more educators consider simulation games as fruitful tools to use in their classrooms. There is also a growing body of literature discussing the potential application of computer games to learning (Gredler, 2003; Prensky, 2001; Rieber, 1996). For example, Ruben (1999) states that teaching with games addresses many of the limitations of conventional teaching. Additionally, he identifies games' value in addressing cognitive and affective learning issues and in facilitating interactivity, collaboration, peer learning and active learning. However, in spite of a growing body of literature highlighting the educational potential of computer games, the evidence to support this assumption is still limited and contradictory, particularly regarding the effectiveness of games for concrete educational purposes (Kirriemuir & McFarlane, 2004; Mitchell, & Savill-Smith, 2000; Vogel et al., 2006), such as teaching leadership. Many game studies are either anecdotal or hypothetical and more studies on the use of computer games to teach practical skills are needed. Therefore, it is essential to examine whether the simulation gaming environments could provide a way to teach students' practical skills needed in modern careers, such as leadership.

The aim of the thesis is to examine whether the simulation gaming environments could provide a way to teach students high-level competencies, such as leadership. Particularly, the focus is to describe the development of leadership styles when leading virtual teams in computer-supported collaborative game settings and to identify the outcomes of using computer simulation games as leadership training tools.

The goals of the thesis are broken down into four subgoals. The detailed subgoals of the thesis are as follows. First, what kinds of leadership styles would emerge during the strategic computer gaming session, and what leadership styles could be exercised by playing the strategic computer game? Second, how do leadership styles influence teams' performance during the simulation game session? Third, what kinds of experiences about leadership did the simulation gaming environment provide for the participating students?

Fourth, what is the effect of computer simulation game training on participants' opinions on leadership style? To answer these questions, three empirical experiments were conducted,

exploring whether participation in business simulation gaming sessions can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills.

1.1. Use of simulation gaming in professional learning

Benefits of using simulation games for educational purposes have been discussed in a number of studies (Aldrich, 2004; Egenfeldt-Nielsen, 2005; Kafai, 2006; Lainema & Nurmi, 2006). One of the reasons why simulation games could be used to train practical skills is that these environments can successfully foster participants' complex problem-solving (Tennyson & Breuer, 2002) and decision making (Salas, Wildman & Piccolo, 2009; Tompson & Dass, 2000) while engaging players in authentic activities. Simulation games allow experiments to be conducted within a fictitious situation to show the real behaviours and outcomes of possible conditions (Lean, Moizer, Towler, & Abbey, 2006) and encourage experimentation with ideas in an imaginary world full of high-risk and complex systems (Gee, 2008). Another critical element of games is the community that develops around them. Ideas are shared in these communities, group problem-definition and problem-solving occurs, and players socialize (Oblinger, 2006).

Therefore, computer games are hypothesized to provide multiple benefits, such as:

- motivation for learning (Gander, 2002; Garris, Ahlers, & Driskell, 2002),
- complex approaches to learning processes and outcomes (McFarlane, Sparrowhawk, & Heald, 2002; Serman, 2001),
- student engagement (Kiili & Lainema, 2008),
- active-learning techniques (Oblinger, 2004).

With all their advantages, simulation games could be used as an innovative pedagogical approach to teaching business concepts (Aldrich, 2004; Prensky, 2001). For example, simulation games have been widely implemented in different managerial disciplines such as strategic management, operations management and accounting (Mitchell, 2004; Sparling, 2002; Springer & Borthick, 2004) and in the field of IT (Nulden & Scheepers, 2002). Bodoff and Forster (2005) used an e-market simulation to introduce IT students to market-oriented information systems. Draijer and Schenk (2004) reported using business simulations in companies to teach best practices. In addition, simulation gaming is widely used in training novice surgeons (Ward, Williams & Hancock, 2006) or in nursing (Stanley & Latimer, 2011).

However, in spite of the benefits of simulation gaming, the game-based learning principles have been criticized by many researchers (Brody, 1993; Buckingham & Scanlon, 2002). The barriers for using computer games in an educational setting include: time scheduling, physical setting, class expectations, teacher background, genre knowledge, technical problems, experience with group work, teacher preparation, perception of games, class size and prioritizing (Egenfeldt-Nielsen, 2004). McFarlane, Sparrowhawk and Heald (2002) study finds that teachers in general are sceptical of using computer games to teach content.

In addition, the evidence supporting the beneficial use of simulation gaming in education is limited, particularly regarding the effectiveness of games for developing concrete skills (Ritterfeld, Shen, Wang, Nocera & Wong, 2009). Anderson & Lawton (2009) summarize that the efficacy of business games in achieving cognitive learning outcomes is still unclear. Furthermore, there is little research-based knowledge on the use of simulation games to teach leadership.

1.1.1. Learning theories behind simulation gaming

There are several learning theories that can be used to explain how players learn in simulation gaming environments. First, in these environments, learning is no longer a process of knowledge transfer from the expert to the novice; rather, learners construct knowledge themselves by interacting with the environment. Constructivist learning theories posit that knowledge is built by the learner, not supplied by the teacher; therefore, the theories of constructivism provide a strong rationale for using games to support learning (Kriz, 2010). Constructivism focuses on the process of knowledge construction and the development of reflexive awareness of that process (Bednar, Cunningham, Duffy, & Perry, 1992). Learners must individually discover and transform complex information, check new information against old rules and revise the rules when they no longer work. For this constructive process to occur, learning also must be situated in a rich context, reflective of real-world contexts. Skills are developed by working on the problem, that is, through authentic activity. This approach represents the concepts of ‘active’ or ‘autonomous’ learning (Johnson, Johnson, & Smith, 1999).

Other literature argues that games, by linking knowledge and doing, support the strategy of learning-by-doing (Barab, Hay, Barnett, & Squire, 2001; Shaffer, Squire, Halverson, & Gee, 2005). Schank (2005) argues that learning-by-doing is always more effective than learning-by-telling and that the former is best accomplished through complex, high fidelity simulations that engage learners at the highest possible level.

These ‘active’ instructional approaches propose supporting or complementing traditional teaching methods with active learning experiences such as role-playing, simulations, self-paced or team-based exercises, and other types of open-ended problems requiring critical or creative thinking. In addition, students are more highly motivated by games than by more traditional instructional presentations (Garris, Ahlers, & Driskell, 2002; Hense & Mandl, 2009; Lepper & Henderlong, 2000).

Further, games provide a meaningful environment for problem-based learning (McFarlane, Sparrowhawk, & Heald, 2002; Whitebread, 1997); therefore, educators have developed learning environments that support complex problem solving (Suomala, 1999). Problem solving can be associated with discovery learning because learning environments like games allow students to discover new rules and ideas rather than memorizing the material presented to them. Discovery learning is a constructivist-based instruction model; it is an approach to instruction through which students interact with their environment by exploring and manipulating objects, wrestling with questions and controversies, or performing experiments (Rieber, 2000). According to proponents of discovery learning, students are more likely to remember concepts that they discover on their own (de Jong & van Joolingen, 1998). In all forms of simulation games, players learn by doing, by trying new strategies and by making mistakes. They construct the knowledge internally by immersing themselves into the gaming environments. Furthermore, in the gaming environment, participants collaborate with each other and group work helps them to share and develop alternative viewpoints. Therefore, 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). The learning process is seen as mediated in a social context in situated learning (Winn, 2002) and the socio-cultural approach. In a social context, physical artefacts (or tools) are a good facilitator for learning new concepts, as they give a shared starting point and potentially show the student new ways to proceed (Wenger, 1999; Wertsch, 1991, 1998).

Simulation games have been also associated with other learning theories for instance implicit learning (Ciavarro, Dobson, & Goodman, 2008) and activity theory (Kuutti, 1996). These environments have been characterized also as a form of experiential learning (Kolb, 1984) because the process of knowledge creation relies on the transformation of self experience (Haapasalo & Hyvönen, 2001). An instructional strategy, posited by Kolb (1984) consists of the following sequence of events: concrete experience, reflective observation, abstract conceptualization and active experimentation. The cycle of experiential learning is very similar to the organizational structure of typical games (Herz & Merz, 1998). Experiential learning has been a common ground for both traditional educators as well as designers attempting to integrate game-based learning with education (Appelman, 2005; Gee, 2003; Prensky, 2001; Salen & Zimmerman, 2004).

According to Gredler (1996), educational games are experiential exercises. They offer here-and-now concrete experiences to validate and test abstract concepts presented in the gaming environment. Such concrete experiences are the heart of this approach, in which knowledge is constructed, not transmitted, as a result of experiencing and interacting with the environment (Kebritchi & Hirumi, 2008). In addition, the research implies that experiential approaches appear to be the most successful in meeting the leadership training objectives (Bass, 1990).

1.2. Leadership development

1.2.1. Leadership

Leadership is an important component in business dynamics and leadership skills are crucial in leading effectively and influencing people to follow directions. Research studies on leadership have grown and expanded over the years, and many theorists have tried to define leadership and a leader's role. One common element among the various definitions has involved the process of influence (Bryman, 1992). Leadership involves persuading people to set aside, for a time, their individual concerns and pursuits and work in support of the communal interest. Leadership occurs when one group member modifies the motivation or competencies of others in the group (Bass, 1990). The goal of a good leader is to establish and reinforce values and purpose, develop vision and strategy, build a team and initiate appropriate organizational change. A useful framework for examining leadership behaviour in context is that of leadership styles; some examples include transformational and transactional leadership (Bass, 1985; Bass & Avolio, 1994; Burns, 1978). Transformational leaders seek to empower, challenge and inspire their followers to achieve goals benefiting the group (Bass & Riggio, 2006). Transactional leadership involves a request and complies exchange between the leader and follower (Yukl, 2006). In addition, there are other leadership styles that help to identify key behaviours or actions that lead to successful leadership practices. Some styles of leadership are discussed below:

- *Heroic leadership* is characterized by the following: feelings that leadership is based on superior knowledge and information; fearing failure; keeping up appearances at any cost including blaming others; and viewing subordinates as inferior creatures in constant need of assistance and rescue (Eicher, 2006).
- *Authoritarian leadership* is characterized by intolerance of difference and challenge. Authoritarian leaders make decisions independently with little or no input from the rest of the group. This kind of leadership requires, above all, obedience and conformity (Bass & Bass, 2008).

- *Directive leadership* is characterized by leaders making decisions, giving instructions and commands, and expecting followers to carry out the decisions relying on a formal position in the organization. Based on their judgment, directive leaders command subordinates and expect their compliance. They clarify followers' roles and tasks and provide instructions (Howell & Costley, 2001).
- *Post-heroic leadership* takes place when the leader wants others to take responsibility and gain knowledge, encourages innovation and participation even in ambiguous situations, seeks input and aims for consensus in decision making, and wants others to grow and learn even at the expense of becoming dispensable herself. Post-heroic leadership has 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 (Bradford & Cohen, 1998; Fletcher, 2004).
- *Shared leadership* is a dynamic, interactive influence process among individuals in groups, the objective of which is to lead one another to the achievement of group or organizational goals or both. This influence process often involves peer, or lateral, influence and at other times involves upward or downward hierarchical influence (Pearce & Conger, 2003).
- *Democratic leadership* emphasizes group participation, discussion and decisions, encouraged by the leader. 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, leaders learn what decision to make (Goleman, 2000).

1.2.2. Leadership skills

Leadership skills are crucial in leading effectively and influencing people to follow directions. Instead of attempting to identify all characteristics of leadership, which could be difficult due to numerous definitions of leadership, we focus on leadership skills that leaders need to develop in order to be successful. Leadership skills can be categorized into four groups (Mumford, Campion, & Morgeson, 2007; Zaccaro, 2001):

1. *Cognitive skills*, such as collecting, processing and disseminating information. Cognitive skills are the foundation of leadership skills and are the fundamental skills required for a large portion of the activities in which leaders are engaged. The most important cognitive skills component is the ability to learn and adapt.
2. *Interpersonal skills* are related to interacting with and influencing others such as negotiation skills and persuasion skills. The interpersonal category of leadership skill also includes the skills required for coordination of actions of oneself and others (Mumford, Marks, Connelly, Zaccaro, & Reiter-Palmon, 2000).
3. *Business skills* are related to specific functional areas that create the context in which most leaders work, such as operations analysis and management of personnel resources. Business skills involve the management of material resources that are important as leaders make decisions about procuring and allocating equipment, technology and materials. These skills also involve the specific skills to identify, motivate, develop, and promote individuals in their work.
4. *Strategic skills* are the highly conceptual skills, such as visioning and problem-solving skills, which are needed to take a systems perspective to understand complexity. These skills are important to determine the true nature of problems faced by the organization.

1.2.3. Leadership training

Many educational institutions are finding it increasingly difficult to produce the meaningful teaching of leadership when using conventional teaching methods such as lectures and presentations. Most leadership courses and trainings fail to train leaders because typical programs teach leadership theory, concepts and principles. These trainings promote leadership literacy but not leadership competence (Allio, 2005). Learning to lead involves dealing with complex situations and collaborating with others to solve problems.

Many leaders are born with qualities and attributes that assist them in leadership effectiveness (Blank, 2001). Early childhood development, education and later on-the-job experiences encourage and nurture leadership abilities (Bass, 1990; Conger, 1992).

Skills and abilities utilized by leaders, such as communicating, problem solving, visioning, decision making and negotiating, can be developed by proper leadership training. Although leadership training is relatively new in the literature, there is an increasing body of knowledge on the issue: for example Day (2001), McCauley and Douglas (2004) and Palus and Horth (2004) are the authors of studies about leadership development.

In order to develop leadership skills, a break from the conventional educational methods of 'learning through listening' must take place, to be replaced by active teaching methods for meaningful learning of leadership. Leadership training programs need to reflect the realistic challenges that leaders face in order to be fully prepared to deal with complexity of today's global and constantly changing world.

Leadership competence develops when an individual is forced to address the challenge of workplace situations, such as innovating, decision making, problem solving and adapting. 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). The leader in training will develop a portfolio of behaviours to draw upon to respond to specific challenges in the future. McCall (2004) suggests that the primary source of learning leadership is experience. In addition, evidence suggests that the most effective leadership programs will focus on building self-knowledge and skills in rhetoric and critical thinking. For example, facing adversity, struggling with unfamiliar situations, being exposed to different people, solving problems and overcoming hardships, and making mistakes are reported to be the most developmental types of experiences (Dentico, 1999). Thus, leadership training must incorporate the challenges of:

- a collaborative, shared mode of operating rather than individualized practice,
- solving complex problems with time pressure involved,
- providing support and guidance for subordinates (team members) and
- practicing decision making.

To train leaders, simulations are required to model (as much as possible) the reality of contexts that future leaders will face. Simulation games are suitable platforms for leadership training because in these environments, leaders can experience leading with complex situations such as communication, conflict resolution, delegation, motivation, decision making and problem-solving.

1.2.4. Leadership training by simulation gaming

Leadership training through simulation gaming could be a suitable way of developing leadership skills because potential candidates become leaders by practice in performing deliberate acts of leadership. The context of experience is a very important factor for the

development of leadership skills (Brown & Posner, 2001; Falk, 2003; Van der Sluis & Poell, 2002). According to Hunsaker (2007), there are several ways that simulations can facilitate the development of effective leadership behaviour. One way is to involve participants learning from peer feedback during the decision making process as they perform the functions of decision-makers and leaders.

A simulation to train leadership is an intensive and interactive platform. The informational content and roles assumed by participants are designed to reflect what people encounter in a particular, real-world environment. In this environment, participants can test their hypotheses and try new solutions to problems (Oblinger, 2004). Most importantly, they have the right to be wrong without adverse consequences (Burgos, Tattersall, & Koper, 2007). In addition, players receive outcomes and feedback in real-time (Laurillard, 1996).

Leadership competence develops when an individual is forced to address the challenge of innovating, inspiring and adapting, all of which could be learned during simulation gaming. Simulation gaming could be a fruitful tool for leadership training because these complex environments present real, authentic problems and solving problems in the simulations demands a concerted and involved application of leadership. Simulation games are therefore well suited as tools to acquire cognitive skills that in real life have to be performed under stress and with great risk. Games are also suited as tools to integrate cognition, emotion, and action in social settings. For this latter reason, they are especially useful for acquiring organizational and leadership skills (Hofstede, de Caluwé, & Peters, 2010).

Simulation gaming is widely used in developing leadership skills in the military sector (O'Neil & Fisher, 2004), and in combat training (O'Neil & Andrews, 2000). Flight simulators are one of the oldest methods used to train fighter pilots (Moroney & Moroney, 1999). Large-scale leadership simulations were used in the 1990s for training corporate leaders: these simulation games included *Looking Glass, Inc.* (simulates a glass manufacturing company), *Globalcorp* (simulates a diversified international conglomerate), and *Metrobank* (simulates a diverse array of business activities). One of the simulations designed to specifically practice leadership is *LeadSimm* (Dentico, 1999). *LeadSimm* is a collective learning leadership development tool designed to put participants in authentic organizational simulations, giving them the opportunity to practice leadership at varying degrees of complexity. In a *LeadSimm* simulation, participants are immersed into realistic complex situations (stories) where they can assess, learn and practice collaborative leadership. 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 (for example, introducing ideas) with other computer-generated characters in order to be an effective leader.

In addition, simulations have been used for examining leadership behaviour and performance (Hunter, Bedell-Avers, & Mumford, 2009) and comparisons of leadership types (for example, individual, dyadic, group) (Dionne & Dionne, 2008), but little research indicates the development and exercise of leadership through simulation computer games trainings.

Therefore, there is a need for research on the application of simulation games in leadership training. This study examines the outcomes of using collaborative computer simulation games as leadership training tools. In particular, we examine whether these environments could serve as tools to provide participants with experiencing leadership styles in practice.

2. AIMS

The general objective of the present study is to examine whether the simulation gaming environments could provide a way to teach students' practical skills, such as leadership, needed in modern careers. Particularly, the focus is to describe the development of leadership styles when leading virtual teams in computer-supported collaborative game settings and to identify the outcomes of using computer simulation games as leadership training tools. 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.

To answer the objectives of the study, three empirical experiments were conducted to explore if participation in business simulation gaming sessions (*Study I and II*), which integrate face-to-face and virtual communication (*Study III and IV*), can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills.

The detailed aims of the current thesis are presented below:

1. The first aim of the study is to explore what kinds of leadership styles would emerge (if any) during the strategic computer gaming session, and what leadership styles (if any) could be exercised by playing the strategic computer game. (*Study I*)
2. The second aim is to examine how leadership styles influenced teams' performance during the simulation gaming session. (*Study II*)
3. The third aim is to examine what kinds of experiences about leadership the simulation gaming environment provided for the participating students and how distance members of virtual teams were taken into account in leadership practices. (*Study III*)
4. The fourth aim is to identify if there is any difference on participants' opinions on leadership styles before and after participating in the gaming session and if participants' opinions on leadership differ depending on the participant role (leader versus team member) in the team. (*Study IV*)

3. METHODS

3.1. Participants

Participants were graduate students (aged between 22 and 25 years old) of universities in Austria, Finland and the USA. In *Studies I and II*, the participants were graduate students of mixed educational backgrounds from one of the best known and highest ranked universities in the USA. In *Study III* the participants included students from one of the biggest universities in Finland and from business schools in Finland and Austria. In *Study IV*, participating students were from the university and business school in Finland. In *Studies III and IV*, international exchange students currently studying at the university and business schools took part in the experiments. In each study, participants were divided into smaller teams; it was three to four participants in each team and each team managed a company during the game. None of the participants had experience in playing the computer games implemented in this study before the experiment with the exceptions of the preselected leaders in *Study IV*.

3.2. Materials

For the present study, two business computer games were used. In *Studies I and II*, 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 objective of the game was to get the net value to the highest possible number by building, upgrading and selling properties. The game provided the participants with the possibility to face real-life business problems and develop ways to solve them. It enhanced teams' interactions, as team members had to communicate in order to make the right decisions.

In *Studies III and IV*, a continuously processed (clock-driven) dynamic simulation game, RealGame (Lainema, 2003), was used, representing complex business processes. Simulation participants were able to follow their company's operations and material flows in real time, providing a dynamic and transparent view of cause-effects in business organisations. The decision making process in the simulation game demanded the attention of the participants and their focus on several decision making tasks on several simultaneous levels (operational and strategic). The success of the decision making was measured by several performance indicators, like cash flow, profitability, production costs, inventory levels and market shares.

For both games, all gaming sessions were intensive, competition-based environments where time pressure was involved and the participants had to make well timed decisions in order to manage their companies. Participants played in small teams, because only in teams can leaders be distinguished. Further, playing in teams provided an opportunity for them to share ideas, build strategies together and learn from each other.

The computer games presented an enormous number of complex operations, which a team leader needed to address the final decision to lead the team to win the game. These environments were in particular useful in developing leadership skills because during the game the leader of the team was needed to lead the team to achieve good business results. Strategy and appropriate leadership techniques were required in order to be successful. Further, the gaming sessions were competition-based and required implementation of leadership skills as well.

3.3. Procedures

The aim of the present study is to investigate if participation in business simulation gaming sessions can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills.

Researchers typically have used quantitative approaches in leadership studies; however, to better understand complex, embedded phenomena, qualitative approaches to studying leadership are necessary (Alvesson, 1996; Bryman, Stephens, & Campo, 1996). According to Conger (1998) leadership involves multiple levels of phenomena, possesses a dynamic character and has a symbolic component, elements better addressed with qualitative methodologies. In addition, Parry (1998) claims that quantitative methods are insufficient to theorize successfully about the nature of leadership, understood as a social influence process. Therefore, in the present study mostly qualitative methods were used. A qualitative approaches focus on ‘building a complex, holistic picture, formed with words, reporting detailed views of informants and conducted in a natural setting’ (Creswell, 1994, p. 2).

Given the contextual and complex nature of leadership, it is important that qualitative methods, as a theory-generating approach, complement quantitative methods, whose strengths are in theory testing. Therefore, in *Study IV* both qualitative and quantitative research methods were implemented.

The next three sections describe the qualitative research methods, which were implemented in the present study.

3.3.1. Observations

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 can be a limitation of interviews and questionnaires. 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).

Observations were implemented in *Study I* and *Study II*. In *Study I*, all notes made during the observation were transcribed verbatim. Then transcripts were coded in terms of the four leadership styles: transactional, transformational, heroic, and post-heroic leadership (see Appendix 1 for the detailed questions). 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, such as Shamir, Arthur and House (1994), Den Hartog and Verburg (1997), and Alvesson and Sveningsson (2003). In *Study II*, qualitative discourse analysis was used to analyze the observations notes transcript (Silverman, 2006). In this study, the transcripts were also coded in terms of transactional, transformational, heroic and post-heroic leadership styles. These developed categories of leadership styles (each had subcategories referring to the given leadership style characteristics) were used to analyze the data (see Appendix 1 for the detailed questions).

3.3.2. *Reflective essays*

Reflective essays were implemented in *Study III*. The participants were asked to answer open-ended questions and to write their essays concerning the gaming experience and their team processes. Questions on experiences during the gaming sessions, teamwork, role distribution, leadership, decision making and general comments on the gaming sessions were asked. The questions were handed to the participants after the gaming sessions and they were asked to answer them as a home assignment.

These ‘end-of-game’ written debriefing techniques (Crookhall, 2010) were used for the purpose of helping students to deepen their learning from the game experience and to better understand the purpose of the gaming session. Having participants reflect on what they do and experience helps to make their knowledge more explicit, as the knowledge they gain during the gaming session is often implicit. This kind of debriefing provides a link between simulation and the real world, clarifies the relationship between the game’s events and real-world events, and connects the game experience and learning. During the writing of reflective essays, the participants can analyse their game experiences in the light of business and leadership theories. The participants can also express their experiences and opinions on issues that are not explicitly dealt with in questionnaires and during discussions in class. The process of writing about feelings and experiences from the gaming session can lead to externalization (Nonaka, 1994), referring to the conversion of tacit knowledge gained during the simulation gaming session into explicit knowledge.

3.3.3. *Questionnaires*

Data for *Study IV* was gathered in the form of pre- and post-test questionnaires, which included scale questions (see the Multifactor Leadership Questionnaire, MLQ, by Bass & Avolio, 2000) and open-ended questions referring to leadership. Transformational, transactional and passive/avoidance leadership was measured using the Multifactor Leadership Questionnaire. The MLQ has two forms: a leader form and a rater form. The leader form was designed to be completed by an individual to measure self-perceived leadership styles. The rater form was developed to be completed by individuals who are asked to measure the perception of the leadership styles of a designated leader. All items were rated based on a five-point scale ranging from 0 (Not at all) to 4 (Frequently, if not always). All participants answered to pre-test questions before the gaming session (see Appendix 2A for the detailed questions).

In *Study IV* leaders were preselected using pre-test (MLQ). The goal was to choose, on the basis of pre-test, the participants who showed leadership potentials. Eight participants were chosen whose scores were high in transformational and transactional leadership styles. They were assigned the roles of leaders during the gaming sessions.

The link to post-test questionnaire was sent to all participants via e-mail after the second gaming session. There were two versions of post-test: one for the leaders and one for the rest of participants to assess their leaders (see Appendix 2B and 2C for the detailed questions).

The summary of data collection and data analysis of the studies in this dissertation is presented in Table 1. The detailed descriptions and methods used in the data analyses are provided in each study.

Table 1. *Summary of data collection and data analysis of the studies.*

Study Research Experiment	Participants	Research aims	Data	Analysis
<i>Study I</i> Empirical experiment I	Graduate students	What kinds of leadership styles would emerge (if any) during the strategic computer gaming session, and what leadership styles (if any) could be exercised by playing the strategic computer game	Observations	Qualitative content analysis
<i>Study II</i> Empirical experiment I	Graduate students	How leadership styles influenced teams' performance during the simulation gaming session	Observations	Qualitative discourse analysis
<i>Study III</i> Empirical experiment II	Graduate students	What kinds of experiences about leadership the gaming session provided for the participants and how distance members of virtual teams were taken into account in leadership practices	Observations Participants' reflective essays and their answers to open-ended questions written after the gaming sessions	Qualitative textual analysis
<i>Study IV</i> Empirical experiment II	Graduate students	The difference on participants' opinions on leadership styles before and after participating in the gaming session and if participants' opinions on leadership differed depending on the participant role (leader versus team member) in the team	Pre-, post-tests questionnaires (the Multifactor Leadership Questionnaire) Participants' answers to open-ended questions	Multifactor Leadership Questionnaire Feedback Report Statistical analysis: One-way repeated measures ANOVA

4. AN OVERVIEW OF THE EMPIRICAL STUDIES

The purpose of this chapter is to provide an overview of each study included in this doctoral dissertation. *Study I* clarifies what styles of leadership spontaneously emerged and became visible in teams during computer gaming session and discussed the possibility of using business computer games to teach shared leadership style. In *Study II*, we examine how leadership styles influenced teams' performance during the simulation gaming session.

In *Study III*, we investigate what kinds of experiences about leadership the gaming session provided for the participants and how distance members of virtual teams were taken into account in leadership practices. *Study IV* examines whether there is any difference in participants' opinions on leadership styles before and after participating in the gaming session and whether participants' opinions on leadership differ depending on the participant role (leader versus team member) in the team. The results of the dissertation study are presented in Chapter 5.

Study I

Siewiorek, A., & Lehtinen, E. (2011). Exploring leadership profiles from collaborative computer gaming. *International Journal of Leadership Studies*, 6(3), 357–374.

The purpose of this study was to examine whether leadership styles can emerge in small teams playing a strategic computer game. The research questions were: 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?

This research study examines the learning of leadership skills in a simulated environment. In the study, we claim that it is difficult to develop leadership skills using conventional pedagogical methods such as 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. Therefore, 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. This study proposes a solution for developing leadership styles by providing students with practical experience in leadership through the use of strategic computer games played in small teams.

In the experiment, a group of nine graduate students participated, playing strategic business computer game in small teams. 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. There were three teams with three members on each team; teams competed against each other. The participants' task was to manage an estate company. Students developed goals, discussed problems and tracked progress in order to win the game.

In the study, observation method was implemented in order to distinguish what leadership styles would spontaneously emerge in teams during the gaming session and to determine how many students (if any) would assume leadership roles. Researchers observed students' interactions while playing the game (how they collaborated, how they made decisions and who made decisions); each researcher had one team to observe. Researchers were not familiar

with leadership styles characteristics and the goal of observation was to objectively describe teams dynamic and teams processes.

For the purpose of data analysis, detailed codes were developed that described each leadership style's characteristics. The transcribed notes from observations were analysed using content analysis.

The results of the study showed that in the course of the game, various kinds of interactions emerged in all teams and all team members were engaged in the gaming session.

In Team 1, transformational, heroic, shared and democratic leadership styles were distinguished. In this team, the role of the heroic leader was implemented with shared and democratic leadership styles that made a positive impact on the team's performance. In Team 2, shared leadership combined with autocratic and coercive leadership styles did not bring effective results. In Team 3, there was no clearly distinguished leadership style; this team had the lowest score in the game.

As a result of the study, shared leadership styles emerged in all teams during the gaming session. Therefore, it could be stated that playing a strategic business computer game in small teams without any predefined leadership roles could provide the tools to develop shared leadership. In conclusion, the gaming environment served as a tool to exercise shared leadership.

Study II

Siewiorek, A., & Gegenfurtner, A. (2010). Leading to win: The influence of leadership style on team performance during a computer game training. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Learning in the disciplines: ICLS2010 proceedings* (Vol. 1, pp. 524–531). Chicago, IL: International Society of the Learning Sciences.

The purpose of this study is to examine how leadership styles that participants applied during the gaming session influence the teams' performance. The research questions were as follows: 1) what leadership styles (if any) could be distinguished during the computer game, and 2) how have leadership styles influenced team performance during the game?

In the experiment, graduate students participated in the training with a 'real estate' computer game. Their task during the game was to manage an estate company in small teams.

The computer game used for the study presented an enormous number of complex operations in which a team leader needed to address the final decision to lead the team 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 were needed to be successful. Further, the training was competition-based, requiring implementation of leadership skills.

Participants' interactions and team processes were observed during the gaming session. Researchers observed participants' behaviours in teams and took notes of each team's collaborations, role assignments and dynamics. The participants were not assigned leadership roles by the researchers before the gaming session. As a result of the observations, each team received a detailed description about its team processes.

The transcripts of notes from observations and students dialogs were coded in terms of transactional, transformational, heroic and post-heroic leadership styles. The method of data analysis was discourse analysis.

As a result of the game competition, Team 1 won the game. The leader of this team used different leadership styles, such as transformational, shared and democratic leadership styles. In the case of Team 1, the transformational leadership and the dependence on a single leader (leader-centred style) resulted in effective team performance. In this team, the role of the heroic leadership was implemented with shared and democratic leadership styles that made a positive impact on the team performance. On the contrary, in Team 2 shared leadership implemented with autocratic and coercive leadership styles did not make for effective team performance. Although shared leadership was applied in Team 2, it did not help the team win the game. In Team 3, there was no clearly distinguished leadership style, which probably caused the team to lose the game. Team members demonstrated a failure to take responsibility for managing and decision making. The conclusion from these results is that leadership is needed for successful team performance.

In summary, playing a strategic computer game in teams of three could provide the tool to learn applying leadership styles in different situations. Therefore, teaching with computer games could prepare students to better cope with business world complexity. Gaming sessions as described in the paper could be implemented in higher business education to teach students which leadership styles should be used in a specific situation to manage similar situations in their future workplaces.

Study III

Siewiorek, A., Saarinen, E., Lainema, T., & Lehtinen, E. (2012). Learning leadership skills in a simulated business environment. *Computers & Education*, 58, 121–135.

The aim of the study is to explore if participation in business simulation gaming sessions, which integrate face-to-face and virtual communication, can make different leadership types visible and provide students with experiences beneficial for the development of leadership skills. The research questions were: 1) what kinds of leadership types spontaneously emerge during teamwork in a business simulation gaming environment? 2) What kinds of experiences about leadership did the simulation gaming environment provide for the participating students? 3) How are distance members of virtual teams taken into account in leadership practices?

In the study, a group of multicultural graduate business students ($N=41$) participated in gaming sessions with a computerized business simulation game. The participants played the game in virtual teams; some teams had a ‘satellite member’ geographically distant from the rest of the team members. Gaming session was organized at the same time but at different geographical locations, namely in Austria and Finland. Students participated in two six-hour sessions of the simulation gaming sessions, which were organized during two successive days.

The simulation game applied in the study was designed to enhance the participants’ understanding of the business dynamics in a manufacturing organization. In addition to managing the operational tasks in their simulation companies, the participants also needed to plan their strategies and decide which markets to enter, which products to manufacture and sell, and whether to start the product development process for a new product. The simulation gaming session was designed to demand leadership skills in the teams. When no one took a clear leadership role in the team, the chances of failing in the decision making tasks were certain; there were many intertwined tasks to be taken care of that, without role division, could not have been managed.

Data included a descriptive report based on the observations of the teams playing the game, participants' reflective essays, and their answers to the open-ended questions that were written after the gaming sessions. All expressions of the reflective essays and all episodes from the observation reports that referred to leadership and division of roles in a team were selected. These expressions were coded on the basis of the leadership styles coding scheme. Based on the coding of essays and process observation reports, the dominating leadership type of each team was determined. The method of data analysis was qualitative textual analysis.

During the gaming sessions, participants showed certain leadership types. Team A, with an authoritarian and directive leader, showed the best financial performance. Team B, with changing leadership and with two leaders but without a clear dominating leadership type, achieved average game results. Team C had one leader who showed shared/democratic leadership; this team's results at the end of the first gaming session were below average, but the team improved their performance in the second session. Team D, which lacked a leader and a clear leadership type, had the lowest financial performance. The two other teams showed no clear leadership type or were not possible to classify in terms of any of the leadership types used in this study.

The results showed that depending on the participant's role on the team during the gaming session, the learning experience varied dramatically. The results also provided initial evidence of the complex nature of experiences from the gaming environments and the need for the team leader and role divisions during the gaming session.

The study indicated that when debriefing sessions (such as writing reflective essays) are used, the simulation game context has much potential to benefit learning. During the writing of reflective essays, the participants can analyse their game experiences in the light of business and leadership theories. The debriefing provides a link between simulation and the real world, clarifies the relationship between the game's events and real-world events, and connects the game experience and learning. This study also provided evidence of unpredictable situations from which participants can experience and learn during the gaming sessions, such as the cartel agreement. It can be concluded that simulation gaming environment has the potential to be used in higher education to exercise the leadership skills relevant in real-world work contexts. However, they must include reflection and analysis on these issues, otherwise the potential learning is not achieved.

Study IV

Siewiorek, A., Gegenfurtner, A., Lainema, T., Saarinen E., & Lehtinen, E. (Submitted). The effects of computer-simulation game training on participants' opinions on leadership styles.

This study examined the outcomes of using a collaborative computer simulation game as leadership training tool. In particular, we were interested in whether this environment could serve as a tool to provide participants with experiencing leadership styles in practice. The focus of the study was to examine whether students' opinions on leadership styles before and after participating in a computer-supported collaborative gaming session would change and to identify whether their opinions on leadership differed depending on a participant's role (leader versus team member) in the team.

In the experiment, a business simulation gaming session was organized for a multicultural group of graduate students ($N = 26$). In order to present the challenges of leading modern

organization, the team members were dispersed geographically and played the simulation game in virtual teams. Some teams consisted of two sites; one team member (a satellite member) was separated from her/his team members and was located in another IT classroom. The teams were brought together by the use of technology.

Before the gaming sessions, the team leaders were selected based on their pre-test answers to the Multifactor Leadership Questionnaire (MLQ, Bass & Avolio, 2000). The questionnaire measured transformational, transactional and passive/avoidance leadership styles. As a result, eight participants were chosen whose scores were high in these leadership styles and they were trained before the gaming session how to operate the simulation game. During the training, the leaders were taught the rules of the game. The leaders' goal was to inform their team about the simulation game and lead the team during the gaming sessions. The participants were divided into smaller teams, each comprising three or four students, which created eight teams (eight companies). They participated two seven-hour gaming sessions, organized during two successive days. During the simulation game, participants were immersed in a realistic market economy in which they bought materials, produced goods and competed with other teams. They were challenged by complex decisions such as which market to enter, at what prices to buy and sell, or how many units to produce.

Data consists of pre- and post-tests questionnaires (MLQ) and participants' answers to open-ended questions. All participants answered to pre-test questions before the gaming session. Pre-test was the same for all participants, but the post-test questions consisted of two versions: one for the leaders and one for the rest of participants to assess their leaders. All questionnaire answers were collected using Webropol, a Web-based survey tool (for more information, see: <http://www.webropol.com>). For the purpose of data, analysis quantitative and qualitative data analyses have been performed.

The results showed that realistic experiences in running simulated companies resulted in changes in participants' opinions about leadership styles. This was, however, only true for team members, whereas team leaders' opinions after the gaming sessions were closer to their ideal opinions about leadership styles expressed in pre-test. It can be concluded that gaming sessions increased team members' awareness of different aspects of leadership and the difficulties of applying ideal leadership models in authentic situations.

The common leadership style according to team leaders (as measured by the MLQ questionnaire) was transformational leadership. Team members experienced the gaming sessions differently and emphasized passive/avoidance leadership in their MLQ answers.

The leadership style dimensions measured by MLQ highlight the individual aspect of leadership. However, one of the main findings of this study, particularly on the basis of the qualitative analysis of the group processes, was that shared leadership style was distinguished in the most successful teams. It might be that traditional individually oriented leadership models are not well suited for successful team processes in technology rich virtual environments.

It could be concluded that the experience of simulation game training illustrated the complexity of real life situations. The gaming session provided participants with challenges of virtual leadership experiences and of difficulties in using leadership styles in practice. In this computer-supported collaborative game setting the leaders experienced how it was to lead a team, make decisions and solve problems. Therefore, one method of training leadership styles in practice could be playing a computer simulation game in small teams.

5. MAIN FINDINGS AND DISCUSSION

The aim of this doctoral dissertation is to examine whether the computer gaming environments could provide a way to teach students' practical skills, such as leadership, needed in modern careers. The focus is to describe the development of leadership styles when leading teams in computer-supported collaborative game settings and to identify the outcomes of using computer gaming environments as leadership training tools. 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.

To answer the objectives of this dissertation, three empirical experiments were conducted to explore if participation in business gaming sessions (*Studies I and II*), which integrate face-to-face and virtual communication (*Studies III and IV*), can make different leadership styles visible and provide students with experiences beneficial for the development of leadership skills. The results of the studies showed that while participants engaged in the gaming sessions, various kinds of interactions took place in teams, and team members were engaged in the gaming sessions. During the gaming sessions in all four studies, different leadership styles emerged and team leaders showed certain leadership styles characteristics.

5.1. Summary of leadership styles distinguished in teams

This section presents the leadership styles that were distinguished in teams according to each study.

Study I

In this study, the following leadership styles were distinguished. In Team 1, transformational, heroic, shared and democratic leadership styles emerged. In this team, the role of heroic leader was implemented with shared and democratic leadership styles that made a positive impact on the team's performance. In Team 2, shared leadership combined with autocratic and coercive leadership styles did not bring effective results. In Team 3, there was no clearly distinguished leadership style; this team had the lowest score in the game.

Study II

In *Study II*, the leader of Team 1 used different leadership styles, such as transformational, shared and democratic leadership styles; this team won the game competition. In the case of Team 1, the transformational leadership and the dependence on a single leader (leader-centred style) resulted in effective team performance. In this team, the role of the heroic leadership was implemented with shared and democratic leadership styles, which resulted in good business measures and a positive impact on the team performance. On the contrary, in Team 2 shared leadership implemented with autocratic and coercive leadership styles did not make for effective team performance. Although shared leadership was applied in Team 2, it did not help the team to win the game. In Team 3, there was no clearly distinguished leadership style, which probably caused the team to lose the game.

Study III

In this study, Team A, with an authoritarian and directive leader, showed the best financial performance. Team B, with changing leadership and with two leaders but without clear dominating leadership type, achieved average game results. Team C had one leader who

showed shared/democratic leadership; this team's results at the end of the first gaming session were below average, but the team improved their performance in the second gaming session. Team D, which lacked a leader and a clear leadership type had the lowest financial performance. The other two other teams showed no clear leadership type or were not possible to classify in terms of any of the leadership types used in the study.

Study IV

According to team members' answers to the post-test's open-ended questions in *Study IV*, the development of leadership styles in teams during the gaming sessions was as follows: the study distinguished shared leadership in Team 1 and shared and democratic leadership in Team 2. In Team 3 and Team 4, no clear leadership style could be distinguished; therefore, these teams were classified as teams with passive/avoidance leadership. The study noted shared leadership in Team 5, democratic leadership in Team 6, shared leadership in Team 7, and transformational and post-heroic leadership style in Team 8.

5.2. Main findings

The results showed that in many successful teams shared leadership was distinguished. Based on these results, we suggest that shared leadership is appropriate for the virtual context. Pearce, Yoo and Alavi (2004) also indicate that shared leadership is more suitable in virtual teams. Further, a few studies have shown that shared leadership is a stronger predictor of team performance than vertical leadership (Pearce & Sims, 2002; Ensley, Hmielski, & Pearce, 2006). The leader-centred leadership style is hardly used by itself in today's organizations. It is becoming more difficult for any one person to be an expert in all aspects of work. Effective leadership in enterprises has to bring together knowledge from different disciplines. 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). Therefore, shared leadership is frequently used in organizational expert teams. Applying shared leadership (Pearce & Conger, 2002) fits well with the reality of distributed teams, since they lack, to varying degrees, the leader's control and the binding force of the community. It could be concluded that playing a business computer game in small teams without any predefined leadership roles could provide a tool to develop shared leadership.

The results of this dissertation provide initial evidence of the complex nature of experiences from the gaming environments and the need for the team leader and role divisions during the gaming session. The division of roles in teams, where each participant was responsible for his/her assignment during the game, seemed to be a decisive factor in successful performance.

Further, role formation allowed for sharing knowledge, learning from others and developing alternative viewpoints. The results also showed that depending on the participant's role on the team during the gaming sessions, the learning experience varied dramatically. The gaming sessions provided participants with many-sided experiences about leadership, but the experiences were very much dependent on the particular team in which a student was participating. Those experiences might have depended on the team processes, how the roles were distributed or how the leader behaved. Thus, when designing this kind of exercise, it is very important for an instructor to carefully consider different scenarios and the participants' roles when designing the gaming experience.

Moreover, the participants who showed interest in leadership roles were given the opportunity to exercise their leadership techniques and develop leadership skills. The gaming session also

provided leaders with the challenges of virtual leadership experiences and difficulties of using leadership styles in practice.

According to Chan and Drasgow (2001), the leader's own motivation and interest in leadership are critical requirements for developing leadership skills, so the gaming session might have helped participants to discover an interest in being leaders and helped them to develop leadership strategies. The participants may use knowledge gained during the gaming sessions to enhance team performance and foster team collaboration in their future workplaces. In this computer-supported collaborative game setting, the leaders experienced how it was to lead a team, make decisions, and solve problems. Therefore, one solution to train leadership styles in practice could be by playing a computer simulation game in small teams.

5.2.1. Unexpected learning situations

This dissertation also provides evidence that unpredictable situations in gaming sessions can facilitate participant learning. This finding supports Gosenpud's (1990) statement that in games, the learner often learns things not intended by the designer, and often this unintended learning is more valuable because it is relevant to the learner. More recently, Gosen and Washbush (2004) conducted a review of research to assess the effectiveness of business simulations on learning. They found that 'learning is an internal mental process, and what is learned and how it is learned is unique to each individual' (Gosen & Washburn, 2004, p. 284).

The cartel agreement emerged during one of the gaming sessions what resulted in an unexpected learning situation. The cartel was found to be the most important trigger of reflection, because all participants wrote about it in their reflective essays and how the teams were trying to break the agreement. The cartel arrangement made a large impact on the teams' relations and was the most powerful thing that pushed players to collaborate during the game.

Important learning situation emerged when satellite members joined the teams. Some satellite members felt that they were 'external' team members because they were geographically distant from their teams. As a result, collaboration between the satellite members and the rest of the team members was not efficient. The satellite members experienced the kinds of problems involved in virtual teamwork, where close relationships, relative permanence of the group composition and face-to-face contact were missing (Lähteenmäki, Saarinen, Fischlmayr, & Lainema, 2010). A majority of the satellite members did not develop any relationship with their remote teams and did not trust their team members. Furthermore, satellite members experienced frustration when being isolated from the rest of their team. The virtual arrangement of teams made challenges of virtual organizations visible and provided valuable experience and opportunity for discussion and reflection on virtual collaboration in teams. Most of the teams did not have adequate strategies to integrate the satellite members into the main team and the satellite members felt that they were excluded from the team processes. This results show that virtual teams are a major challenge for leadership.

5.2.2. Debriefing

The study indicates that when debriefing sessions (such as writing reflective essays) are used, the simulation game context has much potential to benefit learning. Jonassen, Peck, and Wilson (1999) stated that knowledge building requires articulation of what is learned. For usable knowledge to be constructed, learners need to think about what they did and articulate what those actions meant in a verbal, visual and auditory fashion. In this study, reflective

essays and open-ended questions were used as tools for participants to build knowledge. While writing reflective essays, participants can analyze their game experiences in the light of business and leadership theories. The participants can also express their experiences and opinions on issues that are not explicitly dealt during discussions in class. The process of writing about feelings and experiences from the gaming session can lead to externalization (Nonaka, 1994), which means the conversion of tacit knowledge gained during the simulation gaming session into explicit knowledge. This type of knowledge is termed ‘tacit’ (also called implicit) because it exists below one’s awareness level and learning takes place without deliberate effort or attention (Reber, 1993). Many everyday and professional abilities and skills are acquired by implicit learning (Eysenck & Keane, 2005). Geurts, Duke and Vermeulen (2007) emphasized that a game is a communication mode capable of linking tacit to formal knowledge by provoking action and stimulating experience.

The debriefing in the form of reflective essays and open-ended questions provided also a link between simulation and the real world, clarified the relationship between the game’s events and real-world events and connected the game experience and learning. The important learning from the gaming session for team leaders was the reflective knowledge about themselves as leaders after the session. The debriefing also helped the participants to realize how virtual communication is different from face-to-face communication. If the participants were not given the possibility to reflect on the experience, the different nature of working in virtual settings might remain unclear.

5.3. Directions for future research

There are some limitations to the present studies that should be taken into account in the future. First, the sample size of participants in the experiments was small. For future research, we recommend to enlarge the approach by running more experimental studies with a larger number of participants and with implementing control groups. A second limitation of the dissertation is the rather short duration of the gaming sessions. Therefore, replications may want to use a longer gaming sessions in the future.

In addition, new design of the gaming sessions could be applied. For example, it might be revealing to organize leadership training sessions in which participants play in more than one team. In this way, they will have an opportunity to experience variety of leadership styles with different combinations of team members.

Another important issue to consider when conducting research in the future is the assessment of learning from the simulation gaming. According to Gosen and Washbush’s (2004) review of research on effectiveness of business simulations: ‘learning is an internal mental process, and what is learned and how it is learned is unique to each individual’. Therefore, it is difficult to assess what each participant has learned from the gaming session. Using interactive learning environments such as simulation games for teaching purposes cannot be assessed by conventional school-based grading system or by the performance variables, for example “profit” and “turnover” from the game. Team leaders and members who are familiar with the business concepts in the simulation game most probably will have these performance variables higher than participants not familiar with the business concepts. Results with business knowledgeable teams promise better and more authentic results than the game sessions’ results with participants inexperienced in business subjects. Therefore, new assessments methods of learning from simulation gaming environments are needed.

Learning outcomes of simulation games could be best explained by qualitative research methods, which were implemented in this dissertation. Qualitative research methods were implemented because words and often direct quotes rather than numbers are used to illustrate a certain point. To cover the potential learning from simulation games, qualitative research is more suitable because it is open to different kinds of learning results than quantitative research (Lainema & Saarinen, 2010). As a result of this dissertation, few unintended learning situations emerged during the gaming sessions. Therefore, we believe that qualitative research, which better corresponds to the potential diverse learning from gaming, is more relevant to studying the phenomenon of learning than is quantitative research.

For future research on simulation gaming, the use of video-based methods to study the learning outcomes is desirable. In the learning sciences, video research is becoming increasingly popular (Derry et al., 2010) and could serve as a proper method to explain how participants learn in simulation gaming environments. Using video-based methods to study interaction processes in teams playing the game could serve to clarify the learning through simulation gaming. In addition, more research needs to be conducted on the ways of training participants on which leadership style would be best to use in a given business scenario. Case studies could be presented to the participants during the breaks of the game to show them what leadership style would be proper to use for that case study. For example, if one team is constantly running out of stock and its production processes are not effective, this particular example might be examined and solutions on optimum leadership style could be presented for this business scenario. These additions would certainly be beneficial for participants to learn what leadership style is best to use in a similar situation in the future.

5.4. Conclusions

Computer games and simulators enhance learning through challenges, experimentation and interactivity. According to Betz (1996), increased learning occurs by problem solving in a complex interactive multidisciplinary environment and by ‘seeing’ causal relationships between individual actions and whole systems. Learning from simulation gaming is multifaceted and no single schema can do justice to the range of aims that can be achieved by simulation gaming (Hofstede, Caluwé, & Peters, 2010). Further, in simulation gaming environments, what is learned and how it is learned is unique to each individual.

According to the results of this study, gaming sessions have the potential to be used to exercise the leadership skills relevant in real-world work contexts. Although simulation gaming environments are promising tools, we do not advocate simulation games as replacements for faculty involvement, direct student experience, or the hard work of learning. We advocate that simulation gaming sessions serve as environments for leadership skills’ development by providing participants an experience within which they can observe each other’s behaviours and observe, discuss and reflect to learn about certain leadership styles. In summary, simulation games are significant learning tools for practicing leadership styles and skills. However, gaming sessions must include reflection and analysis on these issues, otherwise the potential learning is not achieved.

APPENDICES

Appendix 1

Leadership-style Classification

1. Transactional leadership	1. Transformational leadership
<ul style="list-style-type: none"> • cost–benefit exchange between leaders and their followers • contingent rewards • active management by exception 	<ul style="list-style-type: none"> • inspiring and stimulating followers • idealised influence • inspirational motivation • intellectual stimulation • individual consideration
2. Heroic leadership	2. Post-heroic leadership
<ul style="list-style-type: none"> • omnipotence • rightness • face-saving • co-dependency 	<ul style="list-style-type: none"> • empowerment of members • risk taking • participation • development of members
A). Authoritarian leadership	A). Shared leadership
<ul style="list-style-type: none"> • high degree of control • leader determines all policies, activity steps and work tasks – gives orders • no active group participation, leader mostly makes decisions alone 	<ul style="list-style-type: none"> • mutual influence – dispersed leadership role • members participate in the decision-making process • members fulfil tasks traditionally reserved for a hierarchical leader • members offer guidance to others to achieve group goals
B). Coercive leadership	B). Democratic leadership
<ul style="list-style-type: none"> • leader demands immediate compliance with his orders • leader dictates each step taken • drive to achieve, initiative, self-control 	<ul style="list-style-type: none"> • leader encourages group decisions, participation and discussion • leader builds consensus through participation • leader shares leadership to some degree with members • leader builds organisational flexibility

Appendix 2

Appendix 2A

Game session

Pre-test for all participants

1. Imagine that you are placed in a team where there are four other people and you are a leader of this team. How would you behave as a leader? In your opinion, you as the leader would:

1. Use the following rating scale when answering the questions below:

0- Not at all; 1- Once in a while; 2- Sometimes; 3- Fairly often; 4- Frequently, if not always

0 1 2 3 4

1. Go beyond self-interest for the good of the group
 2. Express satisfaction when others meet my expectations
 3. Focus attention on irregularities, mistakes and exceptions
 4. Emphasise the importance of having a team mission
 5. Help others to develop their strengths
 6. Express confidence that the team's goals will be achieved
 7. Keep track of all mistakes
 8. Suggest new ways of looking at how to complete tasks
 9. Treat others as individuals rather than just as a member of the team
 10. Talk optimistically about the future
 11. Avoid making decisions
 12. Display a sense of power and confidence
 13. Consider the moral and ethical consequences of decisions
 14. Seek differing perspectives when solving problems
 15. Fail to interfere until problems become serious
 16. Wait for things to go wrong before taking action
 17. Provide others with assistance in exchange for their efforts
 18. Delay responding to urgent questions
-

2. Describe yourself as a successful team leader (please write at least three characteristics; for example, respected, trusted etc.)

3. Describe your 'dream-team' leader. How would he/she behave in a crisis situation?

Appendix 2B

After the game session

Post-test for team members to assess their leaders

1. Has the leader of your team:

1. Use the following rating scale when answering the questions below:

0- Not at all; 1- Once in a while; 2- Sometimes; 3- Fairly often; 4- Frequently, if not always

0 1 2 3 4

1. Gone beyond self-interest for the good of the group
 2. Expressed satisfaction when others met his/her expectations
 3. Focused attention on irregularities, mistakes and exceptions
 4. Emphasised the importance of having a team mission
 5. Helped others to develop their strengths
 6. Expressed confidence that the team's goals would be achieved
 7. Kept track of all mistakes
 8. Suggested new ways of looking at how to complete tasks
 9. Treated others as individuals rather than just as a member of the team
 10. Talked optimistically about the future
 11. Avoided making decisions
 12. Displayed a sense of power and confidence
 13. Considered the moral and ethical consequences of decisions
 14. Sought differing perspectives when solving problems
 15. Failed to interfere until problems became serious
 16. Waited for things to go wrong before taking action
 17. Provided others with assistance in exchange for their efforts
 18. Delayed responding to urgent questions
-

2. Has the leader of your team used methods of leadership that were satisfying? Has he/she led a team that was effective? Please describe how he/she was coping with leading the team.

3. Please write comments about your team and about the whole game session.

Appendix 2C

Game-session results

Post-test for leaders to self-assess their leadership

1. Have you as a leader of your team:

1. Use the following rating scale when answering the questions below:

0- Not at all; 1- Once in a while; 2- Sometimes; 3- Fairly often; 4- Frequently, if not always

0 1 2 3 4

1. Gone beyond self-interest for the good of the group
2. Expressed satisfaction when others met your expectations
3. Focused attention on irregularities, mistakes and exceptions
4. Emphasised the importance of having a team mission
5. Helped others to develop their strengths
6. Expressed confidence that the team's goals would be achieved
7. Kept track of all mistakes
8. Suggested new ways of looking at how to complete tasks
9. Treated others as individuals rather than just as a member of the team
10. Talked optimistically about the future
11. Avoided making decisions
12. Displayed a sense of power and confidence
13. Considered the moral and ethical consequences of decisions
14. Sought differing perspectives when solving problems
15. Failed to interfere until problems became serious
16. Waited for things to go wrong before taking action
17. Provided others with assistance in exchange for their efforts
18. Delayed responding to urgent questions

2. Have you as the leader of your team used methods of leadership that were satisfying? Have you led a team that was effective? Please describe how you were coping with leading your team.

3. Please write comments about your team and about the whole game session.

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