Refitting existing simulations to meet with new learning objectives

-From Supply chain management to virtual collaboration

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Abstract

This paper discusses the application possibilities of business simulation games in teaching. By application possibilities we mean the different ways of arranging the learning sessions using the one and same simulation game. Thus, we are not discussing what kind of games should be built for certain educational purposes, or how a game should be built to facilitate certain kind of learning experiences. Our assumption is that a certain game can be applied in different manners to produce very different kinds of learning experiences, serving very diverse learning goals. We are interested in *how the learning potential of existing games can be expanded without making any changes in the actual game algorithms, but by rethinking the activities around the game*. In this paper we discuss the shift from intra-team learning to inter-team learning, and especially further to learning which is based on dispersed inter-team collaboration in a virtual environment. We will illustrate our message with a specific, existing business simulation game.

Introduction

Learning games have long been used in business education for teaching business skills (Faria, Hutchinson, & Wellington, 2009; Henriksen & Lainema, in press; Henriksen & Løfvall, in press; Wolfe, 1993). Often, such simulation games have been used in an instrumental manner, in which the game-facilitator does not exploit the full potential of the game. In this paper, we will demonstrate how a particular learning game can be didactically reconfigured and used in different ways in order to teach a wide variety of business skills. Our key interest is to study how the learning potential of existing games and simulations can be expanded without making any or significant changes to the game itself, but by rethinking the didactic activities and circumstances surrounding the game. We believe that the opportunity for reconfiguring existing game and simulation based materials to meet new educational demands and real-world situations is essential for prolonging the viability of such educational products.

The current study focuses on a simulation game called RealGame (www.realgame.fi), which was originally designed for teaching supply chain management and the dynamicity among the functions of a manufacturing company. In this article, we report the reconfiguration of RealGame, which was redeveloped first to facilitate a shift from intra- to intergroup communication, second to encompass virtual management, and finally to address the issues of roles in business and collaborative groups. We will describe the phased redevelopment of RealGame and illustrate the different learning effects on basis of participant reactions to the very different game applications. The aim is partly to stage a discussion on how existing learning games can be reconfigured didactically to meet with more diverse learning objectives. Partly to encourage university teachers to think out of the box when planning the application of simulation games in their teaching and looking for diverse, multidisciplinary learning.

The Business Gaming Process

This article first discusses the theoretical background for introducing games in adult education. A learning simulation is not just something played during a training session. Rather, simulation- and game-based learning is comprised of a range of different, didactic activities. Villegas (1997) describes the phases carried out during a simulation game training session as follows:

Theoretical instruction:	The teacher goes through certain relevant aspects of a theory and participants can intervene with questions and comments.
Introduction to the game:	The participants are told how to operate the computer and how to play the game.

Playing the game:	Participants get the opportunity to practice their knowledge and skills by changing different parameters of the game and reflecting on the possible consequences of these changes. Contact with the participants is advisable; as is keeping the training going to maintain a positive atmosphere and to secure that the participants feel engaged.
Group discussions:	Each of the participants is given an opportunity to present and compare their results from the game with the results of others. The participants are encouraged to present their results to others. The teacher continually should look for new ways of enriching the discussions and ways to help the participants find the connection between the game results and the real world problems. The quality of this group discussion plays a relevant role in the training as it will affect the participants' transfer of knowledge and skills into the real world.

Existing simulation and gaming literature describes the process in similar manners, combining the gaming experience with theoretical introduction and reflective processes (see e.g.. Henriksen & Lainema, in press). The impression you get from this kind of list is that the process is more or less a fixed one, with a predetermined structure one should follow to achieve the the simulation game learning goals. The learning potential in the simulation game seems to become fixed during the design and implementation of the simulation game, and the facilitators are then supposed to use the simulation game in a predetermined manner. On one hand, this situation is understandable: if the game operator is not familiar with the simulation game, then detailed instructions are needed in order to be able to run a successful game learning session for the benefit of the participants. On the other hand, following blindly the existing operational guidelines may lead to neglecting some potential and valuable learning potential that cannot be achieved with the standard game procedure.

Still, while learning games are often run according to a certified procedure, experienced game operators are often seen improvising in terms of how the game is used in conjunction with other classroom activities, indicating how learning game literacy among teachers allow for such adaptations to be made(Hanghøj & Henriksen, 2011). Our studies on how experienced learning game operators use games show that the same simulation game can be used in very diverse manners, producing very different learning possibilities. These different game applications do not necessarily require any changes in the original simulation game itself, but more in the way the learning setting is arranged and how the activities are organised around the simulation game.

Changing Game Didactics – Not Changing the Game

When facilitating the process during the game, the game operator must be able to assess the situation, see the most appropriate direction for each participant to follow and then send him in the proper direction (van Ments, 1992). This conception of proper direction is elaborated by Dale (1998), who proposes a three-level structure for understanding the rationalities underlying such facilitation:

1) The first rationality concerns the practical and operational carrying out of the teaching activity. In the context of learning games this would be concerned with how participants played and discussed the game in the presence of a trainer or teacher.
2) The second rationality concerns the planning of particular teaching activities; for example, by planning a game-based course.
3) The third rationality concerns the underlying theories on learning and teaching, and would in this case concern the different reasons for using games and simulations.

According to Dale, learning games are designed and applied on the basis of a particular rationality, implying that games (on level three) are a sound method for teaching in business education, while such games would have to be integrated with other didactic activities to facilitate the development of the intended kinds of understandings (level two). Finally, a teacher would have to set up and run the game, carry out the particular presentations, and facilitate the appropriate discussions in the room, all taking place according to the intention behind the game.

Our discussion of game application is an attempt to diverge from the intentionality to which many games are designed. This discussion positions itself somewhere between Dale's first and second level: it is not the actual delivery of the learning activities, nor is it the planning of the teaching activities, but rather the planning on how the actual game or simulation is applied within the particular setting. We have previously discussed various approaches to blending in gaming activities in learning processes by didactically reorganizing how a particular gaming artifact can be integrated (Henriksen & Lainema, in press). In this article, we would like to exemplify how the simulation gaming artefact and its structuration is open for examination, rather than being fixed.

The need for a shift from intra-team learning to networked learning in a multicultural environment

Because of the rapid development of ICT today and the simultaneous globalization of all sectors, more and more organizations are becoming

virtual (Lähteenmäki, Saarinen, Fischlmayr, & Lainema, 2009). More than ever before, organizations continue to be social constructions, whose operation, structure, and borders are constantly changing, for which there is no concrete location, but which depend on ICT in their communication for successful operations because their members are geographically dispersed.

Working in the virtual context calls for totally new organizational thinking. The examples are not only linked to mastering the new technologies, but dealing with virtual communication and coping in a loosely coupled and dynamic network (Jackson, 1999). Global teams—teams that are both geographically distributed and culturally diverse—have been increasingly used to collaborate on projects involving innovation and complex team processes (Köhler, Fischlmayr, Saarinen & Lainema, forthcoming). It is not uncommon that teams are quickly put together and have to perform in an ad-hoc fashion on a project-type task. Especially when team members have not worked together before, they have to establish their teamwork processes and invent their collaboration quickly.

In the virtual environment there are new kinds of challenges related to leadership, information sharing, establishing effective working relationships, and creating commitment. Aside from virtual team members, entire virtual teams, and operations organized according to the virtual logic, there are also units in which employees gather every day at the same physical location to accomplish their tasks in close cooperation with their peers. As these members have deeply internalized the traditional logic of working, they do not even question whether their model of efficient organization fits the new context, but expect it to be followed throughout the organization. Bringing people together with hardly any unifying factors, and entirely different cultural backgrounds (national, organizational, age, gender, or professional) becomes extremely easy. The change from traditional to virtual logic of organizing necessitates radically new orientation to management and leadership issues (Lähteenmäki et al., 2009).

Different approaches towards teamwork, hierarchy, team membership, diverging patterns in communication and collaboration, different decision-making styles and expectations are known challenges originating from cultural diversity (e.g. DiStefano & Maznevski, 2000; Cseh, 2003; Powell, 2004; Bachmann, 2006). Global teams are not only multicultural, but also geographically distributed across different locations and time zones (Köhler et al., forthcoming). Hand in hand with the advancement in information and communication technology, global teams have become more virtual, meaning that they bridge their geographical distances with the support of electronic media.

Universities increasingly will also use multicultural virtual settings to prepare students for their future jobs where they will be confronted with similar settings (Köhler et al., forthcoming). During their future careers graduates will most probably be members of different global teams and will have to collaborate with people from different cultures and time zones due to the ongoing and increasing globalization of all types of business.

Our case in this paper emerges from this development. Originally, the case simulation game was constructed for supply chain management learning. This type of learning is still relevant today, but during the last 5-6 years we have also gradually developed the simulation game to include the challenges of virtual work and collaboration. The aim of developing our case simulation game has been to illustrate to the participants, (a) how do interrelations, mutual trust, and power develop among members in the virtual context, and (b) how can technology help make the virtual context manageable. In the next section, we will illustrate how the simulation game has evolved in this process.

The Case Simulation Game and Its Applications

RealGame is a business simulation computer game which provides a holistic experience of running a business (see www.realgame.fi; Lainema, 2003). The game is played in groups of two or three, which manage their own manufacturing company. The game allows its participants to follow their company's operations and material flows in real time. This provides a dynamic and transparent view of cause-effect in business organisations. Simulation participants are buying raw materials, producing goods and benchmarking their performance with that of the other teams. They are challenged by decisions such as which market to enter, at what prices to buy and sell or how many units to produce. Meanwhile, they have to deal with cash flow problems, supply chain bottlenecks, and the competition from other players. The game operator can use an interface to manipulate the game clock speed to adapt it to the participants gradually developing decision making abilities; usually the clock speed is slower in the beginning of the game, while running faster toward the end of the game session. In summary, RealGame is a continuously processed dynamical system, which involves many activities occurring in everyday business situations.

In this section we will describe four different applications of the case simulation game, each one using the same simulation game, but applying it in a different manner.

1) The original application of RealGame,
2) The application emphasising collaborative networks,
3) The virtual team and global collaboration application,
4) the application emphasising group roles and their effects.

The four applications are described first, followed then by extracts of participant feedback. The feedback is provided to describe how that particular application affects the process from a learner's perspective. This feedback is elaborated in the section on *Experiences from Different Applications*.

Application 1: The Original Application

The aim of the construction process of RealGame is described as follows:

The business model demonstrates the total business concept; it includes the main functions of a general manufacturing organization and its most significant stakeholders. In creating the construction we were interested in describing a holistic business structure with the business functions of a manufacturing company. In the game the players see the functioning of the game company as cross-functional processes. Through playing this game the participants could be trained to understand for example:

- *competitor activities in the competitive environment,*
- *the operation of the supplier-producer-distributor-customer chain,*
- *monetary processes and funding of the business entity, and*
- *how to steer manufacturing processes (Lainema, 2003, p. 14).*

The first RealGame application for university students took place in 1999, and the first company training sessions took place in 2000. These game sessions followed the traditional manner of simulation game teaching organization (as described above by Villegas, 1997), starting with a theoretical introduction to the theories underlying the game, introduction to the game, then the practical game experience, followed by group discussions. The learning aims of the use of the simulation dealt with the topics introduced in Lainema (2003). The organization of the simulation interaction was organized as illustrated in Figure 1: the participants formed companies in the same phase of the simulation supply chain setting, all running similar companies with common simulated raw material suppliers and common simulated end market customers. This setting stages a clear competition between the participating groups and there is no need for collaboration between the groups.

Figure 1: The conventional market structure of a business simulation game.
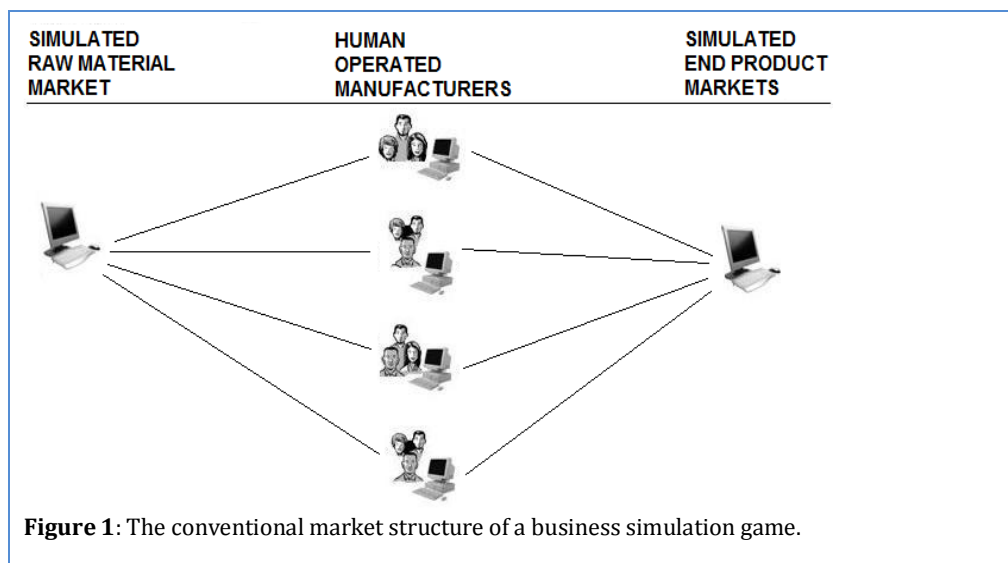
This kind of setting is the most common one in conventional business simulation game sessions. It does not require or facilitate any collaboration between the groups, and the basic setting stimulates competition between the groups. However, according to Mintz (1951), this setup invites the participants into a process, which encourages competition between the groups, but also inhibits collaboration and mutual learning. As each team is running its own company, this setup makes the game easy to apply, but discourages the participants from exchanging experiences to help each other across groups. As any information shared between groups might provide the other part with an advantage, this setup can easily make the participants abstain from sharing the details of their experience. While competition might incite participation, it is important to ensure that this does not diminish the underlying incentive for learning from the experience (see Henriksen, 2008). To better facilitate the learning process, the simulation must be applied in a manner that assures that knowledge sharing between groups becomes a mutual benefit. According to Wenger (1998) this requires the establishment of a shared objective, which creates an incentive for knowledge sharing between formal groups. This setup is further explored in Application 2, in which the participating groups are made mutually dependent on each other.
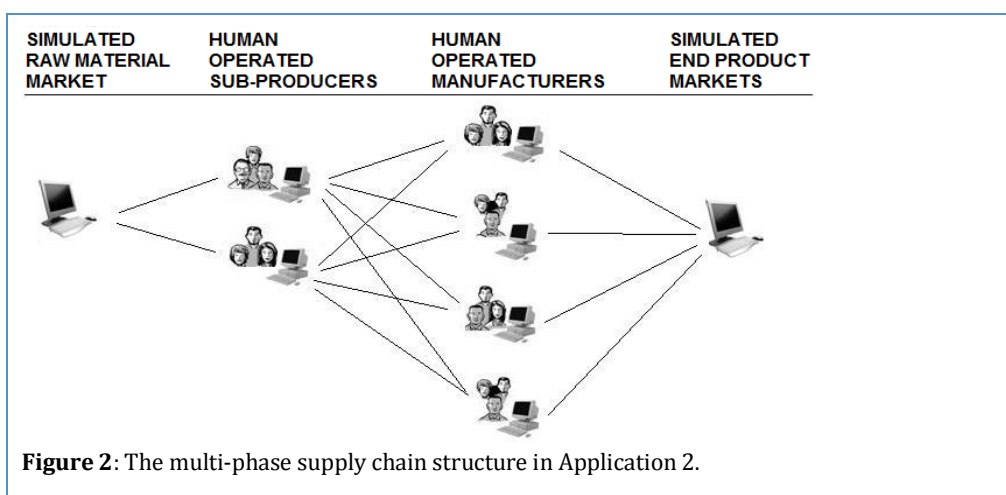
The aim of using the simulation in this application is to provide what Kolb (1984) refers to as a practical experience, which can then be elaborated theoretically. The purpose of this setup is to help participants develop an extensive understanding of strategic supply chain management, based on both a practical and theoretical understanding of the process. Apart from the integration of practical and theoretical understandings, a key advantage of using simulations in this setup is that they provide all groups of participants with similar experiences of the challenges and opportunities in the given situation of supply chain balancing.

Application 2: Illustrating the Supply Chains in Collaboration Networks

A large share of the existing business simulation games and business game literature emphasize the competitive nature of the learning environment. However, in present day industries, the supply chains of companies are based on network structures, within which the companies form alliances and partnerships, in which the partners look for joint benefits, and not necessarily pure self-interest.

Based on the ideas above, the case simulation game was restructured to support longer supply chains consisting of student teams collaborating with each other. Figure 2 illustrates the new structure. In this constellation, some of the teams ("sub-producers") are manufacturing products that are used as raw materials in the next supply chain phase (by "manufacturers"). This kind of structure totally changes the nature of the simulation game session communication from the previous application. In the case of Figure 1, the teams are more or less isolated from the other groups, and the teams concentrate on the internal processes of their companies. In the case of Figure 2, it is essential for the success of the companies to collaborate – without collaboration you will not have sales or raw materials to be used in the production process (and nothing to sell to the customers).

Furthermore, in the structure of Figure 2, it is possible for the teams to develop totally new roles that were not defined beforehand. For example, any of the sub-producers (or manufacturers) could start manufacturing semi-finished products to be sold to the other sub-producers (or manufacturers). This would further create a more diverse and networked environment, facilitating the learning of the challenges present in a longer supply chain.

Figure 2: The multi-phase supply chain structure in Application 2.

Of the four application designs, only this application required actual changes to the software. The subsequent two applications (2 and 3) were achieved merely by altering the ways of using the simulation. The phase in

Figure 2 named "Human operated manufacturers" remained the same as in the case of Application 1 ("Human operated manufacturers" in Figure 1). "Human operated sub-producers" in Figure 2 were created using parametrization of the case simulation game and this did not require any programming.

Reprogramming for Application 2 was minimal, as it only affected the communication channel between the sub-producers and manufacturers while retaining the core-mechanics of the simulation. The reprogramming included the building of a sales dialog interface to be used between the human operated teams.

The key benefit of this application setup is that it provides the groups of participants with mutual dependencies, which forces them to interact while collaborating on establishing a shared understanding of the supply chain that exceeds that which could be established inside each of the participating groups. While still experiencing the challenges of managing the particular companies (as in Application 1), this second application provided participants with access to experiencing similar challenges through their interaction with other groups and their companies.

Application 3: Illustrating the Global and Multicultural Nature of Present Business Environment

In this third application, the case simulation game itself remained exactly the same as in Application 2. Only the participation mechanism of the simulation game was changed. The simulation game itself was installed on a virtual server so that no matter where the participants were, they could connect to the simulation game company as if it was locally installed. This kind of structure allowed the dispersion of the teams and companies as illustrated in Figure 3.
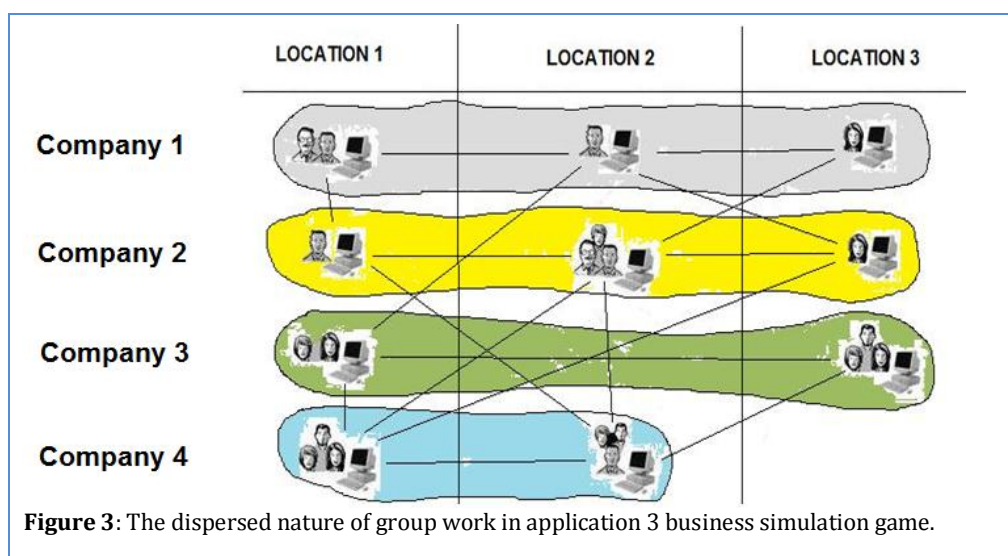

Figure 3: The dispersed nature of group work in application 3 business simulation game.

Figure 4 illustrates the use of the remote connection software (in this case RealVNC©, www.realvnc.com). Each of the team members has exactly the same view to their company. Whatever happens in the company user interface is seen in real-time by all the team members. As a consequence of this constellation, the participants share the virtual mouse, which means that only one member at a time is responsible for interacting with the user interface as decision maker. If several participants were to make decisions simultaneously, it would lead to several people moving the screen cursor in different directions. Thus, there is a natural call for the role of responsible decision maker, who is collaborating in real-time with the other team members. This requires some organizing and agreement in the participating group.

Figure 4: The shared nature of user interface in application 3 simulation.
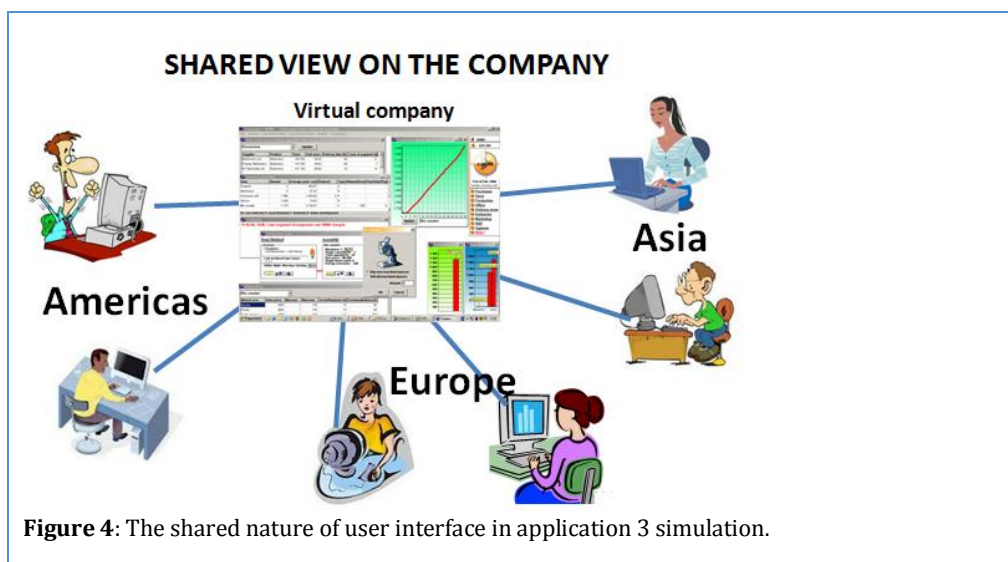
In this dispersed setting, the participants are not at the same location and thus communication becomes virtual. To facilitate the virtual communication, we have used VoIP (Skype) for communicating, both between participants within teams and between participants in different teams, supplemented by email and real-time chat. In addition to the virtual communication challenge, this setup also added the challenge of managing over time zones. As the participants may be located all over the globe, the different team members come from different time zones, as shown in Table 1.

VIBu sessions 7th and 14th October, 2010	Local time			
	Melbourne	Turku	Linz	New York
Start of the session	2PM	6AM	5AM	11PM
Australia main responsibility	2 PM – 8PM			
Common time between Aus&Eur	7PM – 9PM	11AM – 1PM	10AM – Noon	4AM-6AM
Europe main responsibility		Noon – 6PM	11 AM – 5PM	
Common time between Eur&Ame	1AM-3AM	5PM – 7PM	4PM – 6PM	10AM – Noon
Americas main responsibility				11AM – 4PM
End of the session	7AM	11PM	10PM	4PM

Table 1: An example of the time-shift structure in a global simulation game session.

The geographical dispersion of the team members provides a new level of challenges to the simulation; how to handle cross-cultural, virtual management across several time-zones. While cross-cultural management often requires extra sensitivity to be paid to how other group members communicate, virtual management often acts as a communicative mediator that does not allow all the specificities to be seen. For the participants the key challenge of this application setup is to function as a group while not being located together, as well as to balance communication while handling particular issues in the simulation decision-making. This agreement requires both working for a joint target and trust among the team members.

A key feature in RealGame is gradually increasing game-speed, which gradually shifts participants' attention from operational details to strategic management (Lainema, 2003). Participants in a virtual application of the game are similarly forced to make the most of their scarce communication. Thus, while the multicultural dimension can be added by bringing together different people in the session, the virtual setting allows a dimension to be added for demonstrating and exploring scarce communication resources. This effect of experiencing how communication becomes scarce is subsequently used to elaborate on how company managers and virtual teams only have a certain amount of time available for meetings, thereby encouraging participants to find effective means for communicating.

Application 4: Presenting Realistic Organizational Hierarchies
When organising participants into groups, certain roles are likely, or even expected to emerge in the group. One such key role is the group leader, who formally or informally governs the group's decision making processes (Sjølund, 1965). When playing business games, participants either take or are given certain roles, e.g. being responsible for financing, marketing or procurement, and so on. Based on experiences from RealGame, this kind of role differentiation does not always take place, because very often the

participants eagerly start working on what they find most interesting during the session. Our latest application in developing the business simulation game is to add real business managers in a session together with university students. This will be done by adding participants from university executive programs to lead each of the different teams while participating in a game-session based on Application 3. The executives would then help the different teams in forming their strategies, comment on their assignment answers, and consult during the simulation run on company strategies and operations. This application is still under development, and we do not yet have feedback or participant experiences on it.

Method

This study is based on survey assessments, and although the assessment of RealGame participants includes both qualitative and a quantitative assessment, this article only reports on basis of the qualitative data. This qualitative data has been collected through the use of online surveys, which have been made available subsequent to the game, using both open and closed questions.

The particular wording of the questions has been altered during the period to better adapt to new findings in previous assessments. This principle follows the idea of grounded theory, which encourages research methods to be gradually refined to findings (Corbin, 2008). Grounded theory is a set of techniques that provides a rigorous and detailed method for identifying categories and concepts that emerge from text and helps the researcher link the concepts into formal theories (Glaser, 1967). Our application of grounded theory follows these ideas although we do not have any scientific theory to be linked to the findings. Mainly, we aim to show that the development from Application 1 to Application 3 has created a chance to illustrate to the participants the challenges described in the Introduction of this chapter.

The mechanics of grounded theory are simple (Bernard & Ryan, 1998). We have followed the following guidelines: the researcher should produce verbatim transcripts of interviews (in our case the texts are from student assignments) and read through the texts. The potential themes that arise are identified. As analytic categories emerge, exemplars are pulled from those categories together and compared. By grounded theory the analyst develops increasingly richer concepts and models of how the phenomenon being studied really works.

Data and Analysis

In this section we will present some user experiences from Applications 1 and 3, using comments to illustrate the typical feedback from these two applications. There is no analysis from Applications 2 and 4. Application 2

has been used only less than 5 times which makes session data scarce. The reason for this low number of applications is that the longer supply chain in Application 2 requires more participating teams and, thus, participants. These sessions have been with so few participants (less than 20) that the setting has not provided for a full scale session. At the moment, application 4 is but a a proposal for further development, and no training sessions have been run.

Application 1: The Original Application

Data from Application 1 primarily was collected from in-house training sessions in companies' mid-management training programs. The aim of the training sessions was to enhance the understanding of the participants in either the overall logic of the dynamics of a business or a more specific topic of how a modern supply chain is managed and how it affects company profitability and cash flow. The usual size of the training sessions has been from 16 to 22 participants, divided into five to eight participating teams. After taking part in a two day simulation training session, participants were asked to answer a questionnaire on their learning experience, including a number of open-ended questions to address also unforeseen outcomes of participating in the session.

Below are listed some examples of answers to the question: *What were the three most important learning topics for you in the simulation game session?*

1. *How difficult it can be to manage the whole supply chain.*
2. *How important it is for the whole supply chain to know about the changes that happens in any place of the supply chain.*
3. *Cost-effective procurement is very important. You may think that savings with one item doesn't have a big impact for the result of the group, but when there are many small savings the amount to save as a whole is remarkable.*
   (Metal industry, internal supply chain management training session, February 2008)

1) *Don't let your inventory run out. Use reasonable safety margin and ensure second supply source.*
2) *Adjust your supply according to demand. Be proactive and follow demand and other market signals*
3) *Use low price components to ensure cost-competitive products (material costs are 80% of turnover)*
   (Metal industry, internal supply chain management training session, October 2009)

In this application of the simulation game, the participating teams were responsible for managing the whole supply chain themselves and there was

no gaming-related communication between the teams. The participants typically report the importance of managing company internal processes, rather than communicating with the other groups. The answers above are typical in the sense that they do not refer to collaboration. However, some of the participants also refer to collaboration within their own teams:

> *[The] team must be well mixed [in terms of] skills and individuals to form a good performing team - team has to be quick and first put some effort to understand the game (in real life the business/ customers/demands) and its logic to get things running smoothly – it's not [the decision-making] speed but the consistency you do things which lead to success. (Metal industry, internal supply chain management training session, October 2009)*

1.) *[The] importance of supply chain management*
2.) *Communication*
3.) *[D]ivision of the work/ of the different tasks*
   (Metal industry, internal supply chain management training session, May 2009)

1) *The importance of collaboration in company operations*
2) *The optimization of materials and labour costs in aiming at a good result*
3) *Pro-active activity in operations (gives competitive advantage)*
   (Electronics manufacturer internal training session, January 2008)

Given the structure of Application 1, it is no wonder that the feedback does not refer to inter-team communication and collaboration at all. The participants do not refer to cultural issues either, although especially in the case of the metal industry company, the participants presented teams of different nationalities and in some of the sessions there were as many as eight nationalities presented.

Application 3: Illustrating the Global and Multicultural Nature of Present Business Environment

Below, we will show examples of Application 3 user experiences from an international simulation game session from October 2011 with 160 university students from universities in Australia, Indonesia, Austria, Finland, Denmark, and USA. These extracts are collected from student essays after a one day long simulation game session (followed later by another simulation day). In the essay assignment, the students were asked to describe their overall feelings after the first virtual session, their team in general, how the team organized the work, were there any conflicts, and what the students felt they had learned from the experience. 127 students returned the essay (not all participating universities required this

assignment from their students). The 127 students represented 26 different nationalities: Finland (24 students), Austria (23), Australia (12), France (10), China (7), Denmark (6), USA (5), Macedonia (5), Canada (4), Russia (4), Germany (3), Indonesia (3), Singapore (3), Belarus (2), Iran (2), Romania (2), Switzerland (2), Azerbaijan (1), Bulgaria (1), England (1), Italia (1), Korea(1), Lithuania (1), Malaysia (1), Slovakia (1), Spain (1) and Ukraine (1). All together the essays included more than 118.000 words (the average student answer was 930 words).

Before turning to specific issues of the sessions, a quote which shows the general student sentiment after the session – these kinds of comments are very common among the answers:

> *The game was a really positive experience, and I was really able to recognize the differences between cultures during the game. At first I was a bit stressed because of the game, because of the timetable and the amount of planning that it took to play this game successfully. But after all it was a lot of fun.*

As described in the following quote, the combination of the software tools of RealGame, Skype and RealVNC (the remote connection program used to connect to the server in Finland) worked, even though often the participants were unfamiliar with the tools:

> *Working for the first time with an international collaboration, the first virtual team session was an eye-opening experience for me on many different levels. Not being particularly competent with computers, I was relieved that the VNC and Skype connections were functional for the first session. Furthermore, as I am naturally shy and introverted, I was quite overwhelmed having an online conversation with two international students from different schools in Europe. However, as the session continued, I suddenly felt more relaxed as I realised that all of the students involved with the virtual session were equally as anxious and nervous. Together, we overcame the initial barriers and started working cohesively as a team.*

As the online experience appears to be overwhelming for the participant, it indicates that little or no attention had to be paid to running the technical solution. In general, the participants' reports put particular emphasis on the communicative aspect, and especially on the anxiousness and challenges associated with communicating with a global team. In addition, participants mention both the managerial and the communicative challenge of the simulation, indicating how this third application creates a double challenge for the participants:

> *I found that the virtual game provided an overall positive experience. The ability to coordinate with others from around the world and work in a team with people from a range of diverse backgrounds was an especially fruitful experience. In addition, the high level of problem solving and the necessity to be able to deliver on results relatively quickly was an important factor, which although challenging was a great experience. The experience enabled an enhancement of not only general communication skills, but also allowed for a greater managerial and delegation skills. The overall biggest challenges that the team probably faced with this experience, was not surrounding collaborating with one another but rather challenges, which the game provided.*

As can be seen, these comments discuss the dispersed, global, multicultural nature of the application. Although the basic simulation game company in the application is the same company as in Application 1, the comments do not refer to business processes and supply chain characteristics of the simulation company. Still, we would like to argue that participation also facilitates the learning of business processes, although less emphasis is placed on this part as the students focus more on the more immediate and interesting virtual nature of the exercise. It is our impression that Application 3 produces more or less the same experience on the basic supply chain processes, and in addition also experiences on the dispersed, global, multicultural nature of the simulation setting. A student comment confirms this impression:

> *The Virtual Business game was a rather interesting experience. I had played the game before on course [Enterprise Systems], but it was done in class and all the participants were Finnish. So this really was something different compared to the previous experience.*

The setting created by Application 3 is challenging in many ways. The communication and collaboration network is complex, students need to use communication tools that they are unfamiliar with, and the team members have never before communicated with each other:

> *The Vibu virtual team exercise was an exciting and eventful experience. I was rostered down for one of the early few shifts, which required the limited number of team members available and myself to try and grasp on what was required of us to do. The difficulty with this step was that although we all had prepared by reading through the materials before hand, we all still didn't really understand what the game involved…*

Despite these challenges, the setting is seen as intriguing and motivating (the previous quote continuing):

> *...Thankfully, although the team was inexperienced and lacked understanding, each member was keen to try and understand and was more than willing to work together. This provided me with a sense of confidence in my team. After an initial rough patch whilst trying to understand the game, due to the team's level of commitment and strong collaborative efforts the members that were present were able to understand the process of the game. This continued to develop positively as the game progressed further on with each member having a greater understanding as time passed. The team as a whole worked relatively effectively and everyone seemed to have had a fair deal of mutual understanding and respect for one another. This ensured that the experience was rather enjoyable and made collaboration easier within the team.*

As can be seen from the quote above, the setting in the beginning requires self-motivation from the group. As the above comment suggests, if the team is able to struggle through the challenging start of the simulation, the team experience will create trust and good team spirit. The example shows also, that as educators we should not always need to avoid presenting high challenges and fuzzy problem statements to our students, if the learning task itself is motivating and interesting. If the problems are authentic and meaningful, the students are motivated to solve them and collaborate during the problem solving process.

Another comment on the development of collaboration, shows the importance of trust and also the need of well functioning technology and the ability to create new ways of solving problems:

> *...in general our team work was rather effective for 2 reasons: we were able to change our decline and started to show better results due to our teamwork, collaboration and also we got experience in different aspects. I learned that the decision-making process is very essential... We learned how to communicate and during the game created our own way of speaking by using technology. We spoke within team via Skype and with suppliers by writing via Skype because it proved to be more effective rather than calling to them. Through emails we had been exchanging information before the game ... ... at that moment I understand how much our performance depends on proper functioning of technology because if it is broken, you do not have access to the information and just lose time and opportunities. We learned to listen to each other and trust. We learned about business process management, profitability and cash*

> *flow and how to estimate financial information even we did not very much succeed in it.*

Another comment shows how the teams need to work hard to overcome the confusion and complexity of communication and collaboration at the outset of the experience:

> *Indeed, it was not easy to communicate and to share responsibilities among the team virtually. Generally, I prefer to have a real contact with people I work with and I was a little bit frustrated to communicate only through a screen. I think that in such conditions we can't create true relationships between colleagues. Moreover it was difficult to communicate with so many people at the same time because I had to switch between the chat (to communicate with other teams) and the phone (to speak with members of my own team). Thus, it is necessary to be well organized but also very reactive... There was a good team spirit and atmosphere of working but we were not well organized... Everybody wanted to take part in the game but the role that each one had to play was not clear... Moreover we were not all connected at the same time and we took turns. Thus, sometimes some people stopped [left] the game while new ones arrived and it was necessary to explain the situation and our objectives to people who just arrived and to find a new balance among the team... People were calm, they respected and listened each other. Most of the time everybody tried to take part in decisions, we all the time asked if everybody agreed before taking a decision and there was no authoritarian people. There was a good team spirit despite the distance.*

Compared to the real world, the simulation session is of course much accelerated. Still the description above illustrates well the vague organization people face in real world virtual challenges: time zone problems, communication problems, technical problems, lacking information, need to update new people, and so on.

The situation is complex in many different ways, including technical, time zone and culture related challenges, but the students do understand that this will be the case in the modern business life:

> *.. I have never used Skype as a working tool and I have never worked in such conditions before. According to me there were 2 main challenges: the distance and the language. Because of the distance it was not easy to coordinate the team, to share tasks and responsibilities and so, without knowing and seeing each others.*

> *Moreover, we worked in a multinational environment and it was sometimes difficult to understand what people wanted to say and to do because we had different English levels. However, in a context of globalization where the world and businesses are tightly interconnected, working virtually and in English is already and will become more and more necessary. Thus, I found that this experience was a real training for the future. It was an opportunity to discover and to realize what will be the difficulties we will have to face in our future jobs.*

The internationally dispersed environment is not without problems. And adding to the challenge in the virtual environment is technology and its proper functioning. The following student comment illustrates this challenge:

> *As I prepared for the game, it was quite a wreck due to many technical difficulties I encountered in my university computer lab. There was no Skype and it was not permitted to be downloaded. After the game, I was exhausted, frustrated and offended. It was not a pleasant experience but I am willing to give it another shot with an open mind.*

Our experiences from the last five years include similar problems, which are due to the fact that the students (and sometimes the local teachers) do not take seriously the need for testing the communication tools (despite several reminders and warnings about the issue). Still today, it is not self evident that the tools that we take for granted would really work everywhere. This very same problem seems to be reality also in real-world organizations.

Although the vast majority of comments on Application 3 have been positive, there are always teams which for some reason do not perform well. Often, this is due to problems in the communication technology, but there may also be other issues, such as the challenge of taking into account the cultural differences in the teams and how to overcome them:

> *The biggest challenge [in the second gaming session] would be to encourage collaboration and cooperation among [our] team members. Also, improving communication may be a problem as well, due to time differences. Personally, I have learned that one has to be open minded in order to work in an international team. It would require a high level of understanding and empathy to embrace cultural differences so that we could make decisions more effectively and efficiently without cutting each other's throats. Also, I learned that it is good to ask the rationale behind each suggestion*

> *as it would provide me with an explanation as to why they make*
> *such decisions. By avoiding possible conflicts, I always start my*
> *argument in this sense, "My only concern/worry is…" I feel that it*
> *helps to buffer the disagreement which some people may not be*
> *receptive to.*

Despite the rough experience, the student in question shows good
understanding of the situation and efforts that need to be taken into
account to correct the problems. This is very concrete evidence of learning
on communication and multicultural issues.

Discussion

Applications 1 to 3 basically employ the same simulation game and game
interface, but by altering the application of the game, emphasis can be
widened from the supply chain process of a company towards
collaboration and communication related issues so much in focus in
present day organizational environment. In Application 1, the simulation
game creates a process that allows participants to explore business
processes and they learn through in-group peer communication.
Application 2 creates a need for interaction between the participating
teams, and not just inside those teams, thereby allowing participants to
experience a new level of collaboration in a competitive – but also
collaboration requiring – environment. In Application 3, a virtual element
is added alongside a multicultural one, thereby creating a process that
allows participants to explore virtual management and collaboration in a
cross-cultural environment. In the final application, which adds a manager-
role to the process, the division of labour is expected to become more
evident, allowing participants to experience areas of responsibility and the
communication between such. This final scenario of application is expected
to allow learning outcome differentiation, not merely as a random effect of
managing different parts of the simulation, but by allowing participants to
explore and experience particular elements of the simulation, e.g. facility
management, in-group communication, business process management,
communication and negotiation with other companies, or strategic
management.

It is important to bear in mind, that although the shift from Application 1 to
2 required some changes to be made to the game, Application 3 merely
required the provision of a virtual desktop to allow access to the simulation
and communication software to allow participants to coordinate their
efforts. As these tools were already available from other sources, they could
easily be added to the game. The same applies for Application 4, which
merely requires a shift in the team-composition and their internal
arrangement. Although Applications 2-4 might appear somewhat more
difficult to manage (both for the operator and the students) than the

original application, such applications provide a valuable opportunity for adapting off-the-shelf learning simulations to particular settings or desired learning outcomes. In addition, as the core-game stays the same, little or no new competencies are needed for using the game.

Conclusions

The purpose of this article has been to illustrate how changing the application of a learning game or simulation can dramatically change the focus of the process, thereby allowing such games to be adapted to a wider range of learning objectives. In the case simulation RealGame, Application 2 moved emphasis from supply chain management and intra-group communication, to also encompassing inter-group communication, while Application 3 moved emphasis even further to also encompassing globalisation, virtual collaboration and diversity management. In case of Application 2, some minor changes had to be made to the software running RealGame, thereby requiring changes that cannot be made in the classroom. In contrast, Application 3 show how the ways of using the game can construct and meet new educational purposes, using tools that are generally available without having to make changes to the actual software. In the end of this redevelopment, the learning environment and its potential learning content became so different, that the game developers decided to give the end product a different name (VIBu, Virtual Teams in International Business – www.vibu.fi). This renaming illustrates the totally changed nature of the "new" game – still the actual game program remains the same.

Based on our analysis we conclude the following. Firstly, game facilitators should not be afraid of presenting their students with challenges that are not necessarily well structured and clear. Application 3 clearly presented a huge challenge to the students, but when the actual working in the game is empowering, authentic, meaningful and makes sense to the participants, the students are surprisingly prepared to answer to this challenge. The outcome may be that the students experience one of the most interesting and important learning experience in their university time, as some of the students described Application 3.

Secondly, the students greatly valued the collective experience within an international setting, with time zone challenges and cultural diversity. Students today are well aware of the globalization of the working life and need not be explicitly motivated to work in this kind of environment. While some students commented that they were very anxious about the setting, they still were highly motivated to cope with this challenge. We feel that Application 3 is an ideal example of an environment in which to realize that knowledge is context dependent, so that learning should occur in contexts to which it is relevant.

Thirdly, Application 3 also adheres to the notion that learning is an inherently social-dialogical activity. Knowledge, and hence learning, is a social, communicative, and discursive process, inexorably grounded in speech. The way in which a student comes to manifest the effective behavior of a community is to speak with the voice of that community. In Application 3, it is quite clear that the participants are immersed in the roles of decision makers and managers of their virtual companies. Sense-making in the environment results from conversation and dialogue between the different parties in the game environment, forming a community where people share their interests and experiences. Decision-making in teams of two to three participants forces the participants to reason and justify their views to the others. Formulating and carrying out a strategy is a joint effort during which the team members share their expertise and externalize their mental models. The teams' collective learning produces the shared views and goals according to which they run their (game) company.´

At the beginning of the paper, we stated that we are interested in *how the learning potential of existing games can be expanded without making any changes in the actual game algorithms, but by rethinking the activities around the game*. Although expanding an existing game is probably not always as fruitful, the game facilitators should be open minded in looking for wider applications of their existing games – a novel application of a game may produce surprisingly good results in terms of new leaning topic possibilities. When looking at these novel applications, we feel that it is beneficial to discuss and evaluate the potential applications with colleagues from different disciplines. Looking from the perspective of another discipline may reveal the hidden potential in a game.

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