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What is the Perception of Computer-Based Business Simulation Games as a Tool for Learning?

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Master's thesis within IT & Business Renewal

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Abstract

Computer-based business simulation games are rather commonly used tools for learning in business courses in Sweden. However, not always expectations of teachers are achieved with respect to the simulation game as a learning tool. There are number of aspects that students are not satisfied with when it comes down to the use of simulation game and as a result, a gap between these parties evolves. Thus, we have tried to identify the benefits and drawbacks seen by teachers and students and derived critical success factors for achieving higher learning outcome from the use of simulation games.

In order to do that, we have carried out 6 interviews with teachers across Sweden who have been using simulation games in their courses. Furthermore, student opinions were gathered through questionnaire and class observation.

It was concluded that teachers see the simulation game as a very good tool for learning. Still, students are not fully satisfied, since they are expecting more feedback and support from teachers when they are using the game. Furthermore, although the game is supposed to give a good reflection of reality, not always it was seen so by students. Thus, it is important to communicate and introduce the game properly in the course as well as have an assignment that encourage learning and helps students to apply their theoretical knowledge in practice that would be closely linked to reality.

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1 Introduction

Computer gaming industry is one of the fastest growing industries at the moment. Jayakanthan (2002) posits that computer games today are the most popular software type. Today computer games are not only an entertainment tool and used by children. Instead, they can be considered as a widely used education tool applied to many age categories. This is also supported by an increasing number of academic researches that considers games as a tool for learning.

The appropriate use of technology is a vital tool for many companies to achieve success today as well as being up to date with the newest technological achievements in the market. We see that also in the university environment the technology is being more and more widely used in several areas. Some of the technologies are there to support the educational process itself and the structure of it (i.e. more concentrated on administrational issues). Meanwhile there are also technologies that can be directly applied on educational processes. One of them is simulation game, which can be applied in many different educational areas. Simulation games allow students to explore and apply their theoretical knowledge in a safe and simulated environment that reflects reality.

Nevertheless, in order to gain some value from the use of computer-based education approaches, its users have to be aware on how it can be employed. This implies having proper introduction, guidelines and instructions for the teachers and students. Also the benefits of the technology should be described to show the meaning of it. Furthermore, it is also important to follow up after the introduction of the technology in particular environment in order to support a continuous use and development of the technology, which applies also to computer-based simulation games.

Being partly business students ourselves, we aim to explore the use of computer-based business simulation games in the university courses throughout Sweden.

1.1 Background

As we have mentioned before, there are number of studies that address the use of simulation games in the academic field. For example, Jayakanthan (2002) examines the application of computer games in the field of education by looking at the scenarios of computer games that are used for the educational and training purposes. Additionally, Walters, Coalter, and Rasheed (1997) addressed the simulation games in business policy courses and examined student satisfaction with business game as a learning tool. This study explores also group performance issues and relationships within this kind of game. Also Tompson and Tompson (1995) have used ten criteria to assess the use of computer simulations for group projects. Gilgeous and D'Cruz (1996) discuss what is business and management game and present several types of them, and focus also on how and why they are used. Furthermore, Martin and McEvoy (2003) carried a research among students to evaluate the use of business simulation in the tourism education. Additionally, Kendall and Harrington (2003) carried out an empirical study of student learning with respect to four factors: *"strategic management skills, team process skills, level of difficulty, and overall perceived learning"* (Kendall & Harrington, 2003, p. 143). At the same time, Fripp (1997) has presented some of the advantages of simulations and proposed some changes simulation games should be adapted to along the changing nature of the business. Nevertheless, many of them address the study processes in USA and there are only few studies carried out in Europe.

Sweden is one of the most highly developed countries within Europe that also has a well constructed educational system with a strong support from the government. It came to our attention that simulation game is seen as a good learning tool in Jönköping International Business School (JIBS). This was followed by exploring the situation in other universities in Sweden and it allowed us to notice that many of the big universities have courses that include simulation games or even the course itself is a simulation game. This implies that simulation games are rather accepted tools of learning throughout Sweden.

Many of the previous studies address student opinion of the simulation games (Walters, Colater, & Rasheed, 1997; Martin & McEvoy, 2003; Kendall & Harrington, 2003). However, we see that there are at least two big parties involved in the use of simulation game i.e. students and lecturers. Of course, if one enlarges the scope, more parties can be identified such as the educational body in the university, game developers and marketers and also the ministry of education. Nevertheless, lecturers and students are the ones that are the closest and directly involved in the learning process. Thus, this study will focus on exploring their involvement and opinions on the use of computer-based simulation game in the course.

1.2 Specification of purpose

Since we identified simulation games as a commonly used learning tool in universities, it has been decided to explore it more deeply. It came to our attention that teachers do not always achieve what they have expected with the use of the simulation game. Moreover, there are cases when students are not satisfied with the simulation game in the course and do not enjoy it as a learning method. This is rather important issue to discuss, especially when one of the purposes for the use of the game is to make the learning process more interesting activity for students (Kendall & Harrington, 2003; Martin & McEvoy, 2003; Jayakanthan, 2002; Tompson & Tompson, 1995). Thus, we aim to explore what are the reasons behind this phenomenon. Meaning that from the teachers' perspective simulation game is meant to increase the students' willingness to learn; nevertheless, students do not always see it as a good learning tool. The purpose of the research is to investigate the perception of the use of simulation games among students and teachers. This issue is addressed by formulating two research questions.

The primary research question is as follows: *Can simulation games be a good tool for learning? What are the drawbacks and benefits of the use computer-based business simulation games in business courses in the universities in Sweden?* Additionally, we would like to explore what are the critical success factors for the succesfull use of computer-based simulation games in the business courses.

1.3 Delimitations

In line with the research purpose of this paper, our intention was to obtain an overall picture with respect to lecturer and student experience about the use of simulation games. Thus, the paper was delimited in following ways.

First of all the geographical boundaries were set – it was decided to stay within the area of Sweden in order to stay within one educational system. We believe that crossing country borders would require deeper research also on other educational systems, which was not possible due to time constraint. At the same time we tried to explore as many universities in Sweden as possible in order to have a broader view on the topic.

It was decided to focus only on computer-based simulation games. This was done because the use of non computer-based simulation games has different attributes and other factors that can influence its use for learning. Additionally, it allows focusing more on the technological aspects within the field of education. Still, we do not intend to go much into the depth of game technologies as such, but instead focus on the learning aspect of the simulation games. Thus, the reader should keep in mind that computer-based simulation games can be seen as partly representing the evolvement of technologies within the field of education and the development of learning process.

Further, in order to narrow down the topic, it was decided to focus only on business simulation games. Keeping in mind that economics and business are rather familiar study environments for us, there is higher confidence into the ability to carry out a better research and analysis in this particular field. Moreover, in many cases economic and business courses involve only theoretical knowledge acquisition for student from books. Thus, simulation game can bring in more real life aspects. As a consequence, we believe that teachers and students would be able to make a better evaluation. Finally, by focusing on one particular field would allow to make a better comparison and analysis from the results obtained.

1.4 Disposition of the remaining thesis

Chapter 2 – Method presents the existing research approaches and strategies and discusses the data collection methods, their strengths and weaknesses. Also the reliability, validity, and generalizibility of this study are considered.

Chapter 3 – Literature framework explores researches carried out with respect to simulation games and learning and how simulation games are applied as learning tool. Also the advantages and disadvantages of simulation games are summarized.

Chapter 4 – The simulation games identified describes the simulation games used by the teachers interviewed in this study.

Chapter 5- Empirical data presents the responses from the interviews with teachers and summarizes the data gathered through the student questionnaire. Furthermore, it reflects on the class observation and review on student opinions with respect to simulation games.

Chapter 6 – Analysis elaborates on the factors driving the difference between opinions of teachers and students. The critical success factors for learning from simulation games are identified through the analysis of results.

Chapter 7 – Conclusion summarizes the findings derived in this study.

Chapter 8 – Reflection discusses the implications and contribution of this study as well as looks at its limitations. Suggestions for further research are also given.

2 Method

The following chapter will focus on the research method. The existing research approaches and strategies will be discussed and the most appropriate ones for this case will be identified. Data collection methods, their strengths and weaknesses will be presented in this chapter and it will be finalized by discussing reliability, validity, and generalizibility of this study.

2.1 Research in the field of business and social sciences

Teddlie and Tashakkori (2003) propose three groups for categorizing current researchers in the social and behavioural sciences:

- *"Quantitatively oriented researchers working within the post positivist tradition and primarily interested in numerical analyses*
- *Qualitatively oriented researchers working within the constructivist tradition and primarily interested in analysis of narrative data*
- *Mixed methodologists within other paradigms (e.g. pragmatism, transformative-emancipatory paradigm) and interested in both types of data."* (Teddlie & Tashakkori, 2003, p. 4)

The majority of authors in previous studies have applied quantitative approach for their research and carried out statistical analysis for evaluating the effect of simulation games on the education process. They tended to use positivism approaches by simplifying the world in order to carry out the statistical analysis. Nevertheless, not always they are able to provide a statistically significant proof for the link between simulation games and education. At the same time many researchers were able to identify several advantages of the use of simulation games (Martin & McEvoy, 2003; Tompson & Tompson, 1995; Fripp, 1997; Walters, Colater, & Rasheed, 1997; Kendall & Harrington, 2003).

Morgan and Smircich (1980) argue that quantitative research method can be applied when one sees the social world as concrete structure and the analysis can be carried out by examining relations between different elements that are taken away from their context. When researcher omits the assumption of world being concrete and presumes that human beings can actively participate in the creation of the world, quantitative methods can not bring the expected results. Thus, one should move away from the objectivism approaches towards subjective research approaches and qualitative methods are seen to be more appropriate then.

Morgan and Smircich (1980) propose that *"quantitative techniques may have an important but only partial role to play in the analysis and understanding of social change, and in defining the informational properties of a cybernetic field"* (Morgan & Smircich, 1980, p. 87), but the value is rather limited when quantitative techniques are applied within the subjectivism approach. Moreover, they state that researches should not be only observers anymore, instead they should move to the investigation from within the subject of study.

We believe that education process as such is rather complex process to analyze and quantitative approach may not reveal the whole picture. Because of its complex nature, the qualitative approach could provide deeper results and analysis. Thus, we are heading more towards interpretivism approach in the analysis, which implies exploring situation in more detail and reasons behind it (Saunders, Lewis, & Thornhill, 2003). It might imply some amount of subjectivity in the analysis because of the interpretation of data gathered as well as the way the data will be gathered. Nevertheless, some features of the positivist approach

will be applied as one part of the research is gathering and interpreting quantifiable data. This is also suggested by Saunders et al. (2003) that most of the research especially in the business area falls between positivist and interpretivist and may have some degree of realism. Teddlie and Tashakkori (2003) identify this as a mixed method.

Teddlie and Tashakkori (2003) define multiple method designs as researches that include more than one method or more than one worldview. There exist three categories within this design. The first one – multimethod research – deals with combination of two data collection activities which both are either qualitative or quantitative. The second, mixed method research includes both, quantitative and qualitative data collection and analysis techniques. Finally, the third, mixed model research implies that research is mixed in several ways throughout all stages of the study.

For a long time there has been an issue in the field of research of incompatibility of quantitative and qualitative research paradigms. At the same time, there have been numerous researches that successfully have combined qualitative and quantitative approach and this has strengthened the position of mixed research method. Three benefits of the use of mixed methods have been identified. First of all, this way researcher can answer questions that other methods simply would not allow to do. Further, they provide better inferences. Finally, by using mixed methods, one can have a greater diversity in presenting different views. (Tashakkori & Teddlie, 2003) This can be supported also by Saunders et al. (2003) who suggest that two main advantages of combining several methods for one study are that different methods can be used for different purposes and it ensures that data is interpreted more precisely.

As was noted by Saunders et al (2003), qualitative researches are mostly of exploratory nature where it involves theory generation, but quantitative research aims at theory verification. Teddlie and Tashakkori (2003) propose that mixed method research allows approaching both of them. It must be noted, that we found it hard to define the research exclusively exploratory or explanatory, as the aim was to identify the gap between two perceptions and find a way how this gap can be eliminated. By using mixed methods research design, it can complement each other very well and at the end we will be able to derive better results.

According to Saunders et al. (2003) there are two research approaches, namely deduction and induction. The first one is the dominant in the field of natural sciences. It implies that theory is built and tested through data analysis. Saunders et al. (2003) cite Robson who argues that first three steps in deduction approach consists of deducting hypothesis from the theory, expressing the hypothesis in operational terms, and then testing the hypothesis. Testing may include some experiment or empirical investigation. After this the researcher is supposed to examine how the results from investigation comply with the theory and if necessary, modify the theory part. (Robson cited in Saunders et. al, 2003)

Saunders et al. (2003) state that some of the important characteristics for the deductive approach are that in most cases it would be of quantitative nature and the results are supposed to be generalized. Nevertheless, this does not limit possibility to carry out also qualitative study with deduction approach.

The other approach, induction, constitutes of gathering data and carrying analysis that would afterwards lead to the formulation of the theory. When the inductive approach is applied, one can explore issues based more on the context in which they occur. If deductive approach is more focused on exploring what is happening, then inductive approach concentrates on why something is happening or not happening. What is more, inductive

approach is of use when it is rather hard for the researcher to formulate the hypothesis because of the lack of the knowledge within the field. (Saunders et al., 2003)

We believe that the study fits more within the category of deduction research as theory is explored before and after that the data is gathered. Nevertheless, it also aims at identifying why there is a gap between perceptions of teachers and students. Thus, it has implications also from the induction approach.

2.2 Phenomenology approach

Sanders (1982) defines phenomenology as "…*the study of conscious phenomena: that is, an analysis of the way in which things or experiences show themselves*…" (Sanders, 1982, p. 3) Further, Moran (1999) describes phenomenology as *"…the way problems, things, and events are approached must involve taking their manner of appearance to consciousness into consideration."* (Moran, 1999, p. 6) Thus, phenomenology approach allows researchers to explore a particular phenomenon within the context in which it has occurred.

Phenomenology is an approach that looks for ways to make the implicit structure and meaning of human experiences more explicit. This approach explores the science of necessary structure of consciousness or experience. Phenomenologists argue that the essences of matters cannot be revealed by ordinary observations. The focus of the approach is not on the subject or object of experience, but on the pure and imaginative vision on what an experience essentially is. (Sanders, 1982)

Sanders (1982) discusses one difficulty in using a phenomenological approach related to methodological issues. Quantitative analysis is rather well formulated and gives the researcher guidelines on how to perform an analysis, but such precise methodologies do not exist for phenomenological researchers.

Since the aim of this study is to reflect on the experiences of teachers and students when using the simulation game, we see phenomenology as a method to approach the issue. The focus is on exploring actions in their environment and to see what kind of problems may arise for teachers or students when they are using the simulation games, why they arise and how they can be solved.

2.3 Choosing the research strategy

The next step to decide about is research strategy. Saunders et al. (2003) explain it as a general plan for how one aims to answer the research question. They state that justification of the research strategy should always be based on the research question and objectives. Thus, one can indicate how, where and when the data will be gathered and also identify the sample. Saunders et al. (2003) propose several strategies such as experiment, survey, case study, grounded theory, ethnography, action research, cross-sectional and longitudinal studies, and finally exploratory, descriptive and explanatory studies. It is worth noting that they are not mutually exclusive with respect to each other. In order to identify the most appropriate research strategies for this study, at first we will have a brief insight into the most commonly used. Then the most suitable strategies for this research will be defined.

Experiment is a traditional form of research including formulation of theoretical hypothesis that are tested by selecting samples of individuals from known populations and assigning them to different experimental conditions. A change on one variable can be introduced by controlling for the other variables and usually a small number of variables are examined.

Further, surveys are usually carried out using questionnaires from a large sample. Some other approaches could be having structured interviews or structured observations. The advantage of this way is having standardized data that allows for easy comparison and it gives a good control over the research. Nevertheless, a lot of time has to be spent on developing and designing appropriate questionnaire. (Saunders et al., 2003)

Another strategy is case study, which is *"a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence"* (Saunders et al., 2003, p. 93). This approach is suggested for in-depth analysis of some issues which needs a good understanding also of the context of the situation. This could include questionnaires, interviews, observations, and documentary analysis. Next proposed strategy is grounded theory where the collection of data is started without forming the initial theoretical framework. Theory is developed afterwards and some predictions are generated based on the data gathered at the beginning. These predictions are tested by further observations and theory is developed. (Saunders et al., 2003)

The origins of ethnography approach can be found in the field of anthropology. Thus the aim is to interpret the social world by observing some participants. Although the method can give very good analysis and results, it is very time consuming and researcher has to be flexible with respect to changing environment. (Saunders et al., 2003)

The purpose of action research is to change the world instead of just exploring, describing, analyzing and understanding it. The researcher is usually involved within the action for change and applies the knowledge that he/she has gained elsewhere. The benefits of this approach that change can be observed and seeing the time value that is required for the change and how it affects the participants of the changing environment. (Saunders et al., 2003)

Cross-sectional and longitudinal research methods refer to the time aspect of a study. The former one focuses on taking a snap-shot of one particular moment whereas the second one focuses on studying change and development. (Saunders et al., 2003) Finally, exploratory, descriptive and explanatory approaches describe the purpose of the study. Saunders et al. cite Robson with respect to exploratory studies writing that they are *"valuable means of finding out 'what is happening; to seek new insights; to ask questions and to assess phenomena in a new light"* (Robson cited in Saunders et al., 2003, p. 96). Saunders et al. propose three ways how to carry exploratory study, namely by searching through the literature, interviewing experts from the subject and conducting focus group interviews. For the descriptive studies the aim is "to portray an accurate profile of persons, events or situations" (Robson cited in Saunders et al., 2003, p. 97). It is vital to have a clear picture of the issue that is being explored prior the collection of the data. As a drawback can be mentioned that in many cases it is expected that researchers will go more in depth with the results they have gotten and find reasons behind, but this is not the aim of descriptive study. Finally, explanatory studies aim at setting casual relationships between variables in the study. (Saunders et al., 2003)

2.4 Approach applied

All above mentioned approaches have their advantages and limitations. In order to carry out more in-depth analysis, we have decided to combine several of them.

First of all, this study is focusing on the case of Sweden and how simulation games are applied in the study environment. This is done by gathering data through semi-structured interviews and questionnaires. The aim was to capture two main involved parties in the proc-

ess of education – students and teachers. We see this as a cross-sectional study with respect to cases explored in Sweden. Additionally, it has the time limitation factor, meaning that the current situation is explored with some reference to the past, depending on each case; it might be that some of the respondents were reflecting on their experience over the past several years. Moreover, if the method theory presented by Saunders et al. (2003) is followed, this study can be considered more of an exploratory type where it would include interviewing several teachers who are using simulation games in their courses, with some insights from descriptive and explanatory types, like gathering data from students using questionnaire.

Three approaches to gather primary data for this study were used. First of all, semi-structured interviews were held with teachers who are using computer-based simulation games in their courses. It was expected from this sample to represent one side of simulation games as a tool for education. In order to assess the effectiveness of this tool, students were queried by a questionnaire. Additionally, an observation of students' assignment presentations who had been playing the simulation games, took place, where questions for the whole group were asked after their presentations. Finally, teachers were approached for possibility to provide us with the evaluations of the courses and grades of the students. This leads to the collection of secondary data.

Johnson and Turner (2003) indicate that there exist intramethod mixing where single method includes qualitative and quantitative components. Further, they indicate intermethod mixing where two or more methods are mixed at the same time or they are followed one by one. According to their division, this study includes both, intramethod mixing and intermethod mixing. The first one is seen in our questionnaire, which consists of open- and closed-ended questions. The second one is different methods used to gather data from students.

Johnson and Turner (2003) cite several authors with respect to the fundamental principle of mixed methods research that has to be kept in mind by the researcher. It implies that methods should be combined so that they complement each other strengths and do not overlap in their weaknesses.

2.4.1 Interviews

With respect to interviews, Johnson and Turner (2003) indicate that in order to avoid biasing effect, it is very important for an interviewer to remain non-judgemental to the answers of interviewee. One of the advantages of interviews compared to questionnaires is that one can ask interviewee to go in depth in some of his/her answers or discuss more some of the topics mentioned.

There exist three types of interviews: pure qualitative, standardized open-ended interview, and quantitative interview. The first type is like interview guide approach, where interview topics are pre-specified, but the sequence of them and the way the questions are asked, can be adapted to each interview. Thus, interviews are rather unstructured. They allow for more in-depth discussion on the particular topic and consist of open-ended questions. The second type is mixed interviewing and consists of predefined open-ended questions that have the same wording and sequence on the interview protocol. It could also allow for combination of open-ended and closed-ended questions. The third type, quantitative interview has a standard interview protocol that is used the same way with all respondents. The interview consists of closed-ended questions where all the response categories are predefined by the researcher. (Johnson & Turner, 2003)

As argued by Johnson and Turner (2003), interviews allow for measuring attitudes and content of interest as well as provide in-depth information on the topic for the researcher. They are useful for exploration studies and imply good interpretive validity. Nevertheless, it comes at the cost of being rather time consuming method and involving rather complicated data analysis. We are aware of these advantages and drawbacks of interview as a method, yet the exploratory nature of this study allows for exploiting the benefits of the method to a larger extent and drawbacks are seen only as a minor factor.

Therefore, semi-structured interview questions for the teachers were developed in order to receive their opinion and experience. According to the methodology of Johnson and Turner (2003), those are standardized open-ended interviews that are carried out with the teachers. Questions were developed beforehand based on the literature studied and it was intended to ask the same questions to all teachers in order to be able to make better comparative analysis. Still, the teachers were approached beforehand by asking them if they would be willing to participate and asking for their background with respect to using the game. Thus, the interview questions could be adapted to some extent to each specific case by dropping some of the questions that were irrelevant for the specific case and some questions could be modified to better suit the case.

Questions included issues such as teaching background (for how long time teachers have been teaching, how long they are using simulation game), questions about simulation game (how they decided about it, how they get familiar with it, how did they introduced it into the course, if there were any assignments for students), development over time (if they had changed it over the years), indicate the benefits and drawbacks of the game as well as give their opinion about simulation games in general. Taking into account that numerous teachers were approached throughout Sweden, some of the teachers were interviewed using e-mail. Thus, it allowed them to answer the questions any time that would be most convenient for them making them more comfortable with participating in this research. This approach has some drawbacks as it does not allow structuring the interview more for the respective case and asking additional questions.

2.4.2 Questionnaire

When discussing questionnaires, Johnson and Turner (2003) discuss three types: a qualitative questionnaire, a quantitative questionnaire, and a mixed questionnaire. The first one is *"an unstructured, exploratory, open-ended, and (typically) in-depth questionnaire"* (Johnson and Turner, 2003, p. 303). In comparison, the second type of questionnaire is completely structured and consists of closed-ended questions. Mostly they are in the form of rating scales, rankings, and checklists. The final type of questionnaire includes open- and closed-ended questions.

Among the strengths of questionnaire as a method is that it allows to measure attitude of the research participants and the data analysis for closed-ended items is comparatively easier. However, the questionnaire has to be kept short and there might be some missing data. Furthermore, the response rate for mail questionnaires might be rather low and open-ended items can give rather wide data that can be hard to analyse. (Johnson & Turner, 2003) Since we aim to get an overall opinion from students and use the questionnaire data in combination with class observation and course evaluation forms, the weaknesses of the questionnaire method will be minimized.

The student questionnaire (See Appendix B) was developed based on some previous studies that helped us to identify the necessary variables to explore (Tompson & Tompson,

1995, Martin & McEvoy, 2003). The questionnaire in total consisted from 32 questions out of which 8 were open-ended questions. Some of them asked for student background information (such as gender (Q 1) and university they are studying at (Q 2) and how much time they spent on the game and assignment (Q 22 & 23)). Nevertheless, others were aiming to go more in-depth in the reasoning of students why, for example, they played the game several times (Q 25), or if they would like to have some other project instead of simulation game (Q 28) and give some suggestion, how to improve the game and use of it (Q 29). Additionally, the final question was added for students who were willing to add something or express themselves more in depth on some of the topics. The rest of the questions were closed-ended questions. From these, 14 questions were Likert scale asking students to indicate to what extent they could agree with several statements about the game and its use. Other questions provided students with a list where they could choose several answers from the provided ones on a particular question.

Additionally, the purpose of the questions in the questionnaire differed as some of them directly aimed at answering the research questions whereas some questions were asked to gather some background information. Questions were also asked to get information that could support the analysis towards answering the research question. Please note that some of the questions can be partially background question and also aim at helping to answer the research question (Q 7-8, Q 12-13, Q 19, Q 30). As pure background questions we distinguished Q 1-3a, Q 22-24, and Q 27. The following questions will provide information that will help to find an answer for the main research question on simulation games as learning tool: Q 3c-d, Q 3g, Q 4-6, Q 9-11, Q 15-21, Q 28, and Q 30-31. The rest of the questions aim at helping us to support our analysis on simulation game as a tool for learning as well help to formulate the critical success factors.

2.4.3 Class observation

Observation method implies that *"researcher observes participants in natural or structured environments"* (Johnson & Turner, 2003, p. 313). The authors indicate that observation is very important method as not always people do what they say they do. One of the drawbacks of this method is that after observing for a while, the observer may loose his/her reactivity. Goffman notes that usually people allow seeing others their front-stage behaviour whereas the backstage behaviour is seen only by closest friends or when they act naturally (as cited in Johnson & Turner, 2003). Thus, one should keep in mind that person that is being observed, may play some role at the particular moment.

Similar as for interviews and questionnaire, there are also three types of observations: pure qualitative observation, intramethod mixed observation, and pure quantitative observation. With respect to pure qualitative observation, it is carried out in real-world or naturalistic settings. Researcher may take fieldnotes or audio, video record the action and carry out the analysis later on. There are four roles that may be taken by researcher in qualitative observation: complete participant (researcher becomes a full member of the group, but group is not aware of his role there), participant-as-observer (the group members are informed that this person is observing them and observer spends a lot of time within the group), observer-as-participant (here a limited time is spent within the group by observer and the group is also informed that they are being observed), and complete observer (researcher observes the group from outside). Thus, reactivity may be a problem for the second and third role. (Johnson & Turner, 2003)

At the same time pure quantitative observation involves the use of standardized coding instruments. In most of the cases observation is videotaped and afterwards it is coded using predefined coding schemes. When looking at the intramethod mixed observation, some features from qualitative and quantitative observations may be involved. As an example Johnson and Turner (2003) proposes having a priori protocol and also take extensive fieldnotes both, during and after the observation or separately conduct qualitative and quantitative observation. Another option is to use intramethod mixing, where observation is supplemented with other data gathering methods from the same sample or other individuals in the setting.

According to Johnson and Turner (2003), the strengths of this method is that the researcher can understand subjects' actions and does not have to relay exclusively on what participants may say they do. Thus, it allows for relatively objective way of measuring behaviour. It can allow also seeing some of the contextual factors, which is rather important for this study. However, at the same time the reasons for some behaviour may be rather unclear. (Johnson & Turner, 2003) Thus, we will try to explain this with the help of questionnaires and interviews. There is also a possibility for observants to be influenced when they know that they are being observed as well as observer him/herself may be biased. It can also imply for rather low interpretive validity of data and observations are limited to small populations. (Johnson & Turner, 2003) In order, to minimize the weaknesses, we tried to be as objective as possible with respect to respondents and served more to the role of being observer-as-participant.

A class observation was made when we attended a seminar in JIBS where students were presenting their results from the simulation game and had to reflect also on the simulation game. Additionally to the results from playing the game presented by students, a feedback was given from their tutor on their mistakes, success and overall strategies. The students' impressions and experience from playing the game were discussed in the class at the end of the presentation. We were acting only as observers during the presentations though in the beginning teacher informed students, that they will be observed for the research purposes as well as we gave a short introduction about the study to the students. Finally, at the end of the lecture we asked some overall questions concerning their opinions on simulation game as a teaching tool and their opinions on using it. It is worth noting, that observation was not strictly planned before, instead notes were taken during the class and also with respect to student opinions on the questions at the end of class.

2.4.4 Secondary data

Secondary data is mainly the data that has been gathered for other purposes than for the research currently going on. Secondary data can be personal documents that are usually collected for private purposes. Further, it can be official documents, which are recorded by some organization members, like books, newspapers, educational journals, annual reports, student records, etc. Secondary data can be also physical data that are traces left by some people when taking part in different activities. Final group is active research data that was gathered for purpose of another research and afterwards was stored in case of need for later use. (Johnson & Turner, 2003)

In most cases, secondary data method is combined with other data gathering methods. In this case, official documents like books, newspapers, articles and also student course evaluations have been used. Secondary data is good for giving insight into activities and thoughts of people. It is useful for exploration and can be collected over the past time pe-

riods. Still, this data may not be complete and not always one can have access to the necessary data. Further, this data may not apply to general population. (Johnson & Turner, 2003) However, we see the secondary data as a good tool for building the theoretical framework, as the validity and reliability on the scientific researches and books is high. Whereas the student course evaluations were used for informative purposes and supportive factors on student opinion.

2.5 Sample

During the research 48 teachers from 13 different universities in Sweden were contacted via e-mail. The teachers who used simulation games in their courses were asked if they would be willing to participate in the study. It was decided to use snowball sampling method when contacting universities – if the person did not use any simulation game, he/she was asked if any of his/her colleagues use a simulation game. Also if the teacher used a simulation game, he/she was asked if there is any other colleague that would also use some game. From all the e-mails 27 replies were received which covered 9 universities out of which 13 teachers indicated that they are using computer-based simulation games and would be happy to share their experience. The rest of the teachers noted that they are not using simulation games and due to the time constraints the reasons behind their decision were not explored. Out of 13 teachers, who agreed to participate, only 6 teachers from 5 different universities have been interviewed either through e-mail or personal meeting. For other teachers a reminder was sent after which only one teacher responded by saying that he agrees with the answers provided by his colleague due to the fact that his colleague was consulting him when answering questions through e-mail.

With respect to the class observation, it was one session that included 6 student groups presenting their results. Approximately 25 students were present at the lecture lead by one teacher and approximately 30% got involved in a discussion when questions were asked by observers at the end of the lecture. What concerns the student questionnaire; with the permission of the course director, e-mail addresses were received of students that have been taking the course over the last two years that includes approximately 390 students. An e-mail with a link to the questionnaire was sent to these student and 67 responses have been received from students in JIBS that have been playing PharmaSim simulation game.

We would like to stress, that due to access to particular resources, it was possible to gather more data from JIBS, and thus it may lead to some bias towards the situation in this university. However, this will be taken into account when carrying out the analysis.

2.6 Qualitative data analysis

When analysing the results from the interviews, a thematic analysis was used. Thematic analysis is the version of content analysis wherein the analyst looks for themes which are present in the whole set of interviews and creates a framework of these for making comparisons and contrasts between the different responses (Gomm, 2004). As the qualitative data analysis was started, the responses of teachers were organized in a table in order to be able to see and compare different answers. When reading and comparing them, we took the essence of the answers that had interesting input to the thesis. When analyzing the coded answers we tried to see the theme of the answers to be able to get an understanding of our respondents experience and opinions. The answers were coded by summarizing the essence from the interviews in a short statement or sentence that would allow classifying it with respect to other answers. Following, it was decided what in the answers could account

as evidence of the theme that was noticed. This is in line with Gomm's (2004) suggestions for a thematic analysis. However, the part of the interviewees answers that did not fit into the theme discussed was used as a reference when discussing other areas within the interest.

Gomm (2004) states the importance of having the analysts' perceptions of the interviewees answers validated. To ensure that the respondents were understood correctly, transcriptions of the interviews were sent to the teachers for validation.

2.7 Quantitative data analysis

When analyzing the data gathered through the student questionnaire the statistical software program SPSS was used. The main function that was used is frequency analysis where the means, median and other indicators were derived. In the analysis we used quantitative variables with two or many categories depending on the question.

One might note that the sample within the quantitative analysis is not very big. However, we would like to note that in the phenomenological study the sample size does not matter. Moreover, Hardy and Bryman (2004) argue that having too many cases and variables might limit researchers' ability to see what is actually happening.

2.8 Reliability, validity, and generalizability

In order to ensure a high quality of the thesis, reliability, validity, and generalizabilty issues have to be acknowledged and realized. For a research to be reliable, the findings should be the same if the study is replicated by anyone else. This implies that the attitude of the respondent remains the same, meaning that it is independent from the researcher. (Riley, Wood, Clark, Wilkie & Szivas, 2000) The results should also be the same if conducted by someone else; thus, proven not to be affected by a biased opinion of the researcher (Nordqvist, 2007). However, with respect to phenomenological study, the reliability is limited concept meaning that in this kind of study results are highly integrated into the context. Thus, when one tries to repeat the study, the results derived can be the same only to limited extent.

By developing the interview questions in a manner that gave the respondents possibility to explore their answers, the risk of having a biased research is minimized and the true meaning of the respondents' answers is delivered. Nordqvist (2007) also stresses the importance of presenting unbiased data. Since personal interviews were recorded and typed down afterwards, we believe they present very well the content of the interviews. Interview transcripts were sent to the interviewees in order to ensure that interviews were correctly transcribed. E-mail interviews were in written form, thus respondents' own wording was used for the further work. Saunders, Lewis & Thornhill (2007) present that there might be an error made by the participant with respect to timing of the interview. For example, the respondents may just have had a poor experience with the game; thus, answers are exaggerated because of the emotions and biased towards extreme answer. Though there is no such issue in this study since the student respondents answer the questions some time after playing their last session of the game and their responses are not influenced by their immediate emotions towards the game. Further, Saunders et al. (2007) suggest that there might be a participant bias in the study and it threatens the reliability. This occurs when participants might have discussed the questions and formed an opinion as a group and not as individuals. However, we believe that the students did not have intentions to form answers as a

group due to the fact that these responses will not have a significant impact on them personally. Moreover, online questionnaire form allowed us to see the time when it was submitted and this time was dispersed. Additionally, Saunders et al. (2007) stress the risk of having an observer bias and error. In this case, during the observation all opinions were listed and the respondents were given the opportunity to elaborate on their opinions at a later stage in order not to get a biased opinion.

It is important to ensure that the findings of the research are really about what they appear to be about for the research to be seen as valid. (Saunders et al., 2007; Riley et al., 2000) As the results are determined by number of respondents with the same experience, they imply for high validity of opinions expressed. Several lecturers from different universities in Sweden were interviewed; thus, the reliability of having an understanding of the educational purpose of the game is spread and not merely dependent on one university and opinion.

Johnson and Turner (2003) discuss the validity issues in the data collection and as the main explanation behind the validity proposes that the research has high validity if *"experts (e.g., academics, practitioners, or anyone else who carefully examines research report) consider the research to be well done and worthy of readers' attention"* (Johnson & Turner, 2003, p. 300). In their article they address numerous validity types and issues that have been discussed in the academic literature. One of them is descriptive validity that refers to *"the factual accuracy of an account as reported by the researcher"* (Johnson & Turner, 2003, p. 300). It implies that data is carefully collected and supported during the collection to ensure its accuracy. Another type is interpretive validity that refers to how accurately researcher interprets the data collected. The main point in this type is to understand the views of research participants.

Johnson and Turner (2003) refer also to five sources of validity defined by Webb, Campbell, Shwartz, and Secherest (2000). The first one is reactive effects where a problem may arise when respondents are aware that they are being observed. The second one may come from actions carried out by researcher during the study (like participants are influenced by some characteristics of interviewer or researcher, his/her skills can get influenced during the research process). Further, there might be varieties of sampling errors which means that researcher was not able to gather perfect samples of people, time, or space. The fourth problem is access to content where investigator is not able to obtain perfect sample of relevant content. Finally, there could be problems with operating ease and validity checks like amount of irrelevant material.

Validity can also be seen in an internal and external aspect. The former one is concerned with *"one's justification in making casual inference from ones data"* (Johnson and Turner, 2003, p. 301). Whereas the later one is concerned with the generalization of the study results to other people, places, settings and times. These types of validity are mostly related to quantitative researches.

Saunders et al (2007) also state that the generalizability of the research should be expressed. Although there can be some generalization as the research is conducted in various locations in Sweden; still the area studied might be too small to make generalizations to the whole population/world. However, the conclusions derived can be applied to the particular population that was studied and critical success factors derived can serve as a guide to some people outside the sample. Finally, there have been many studies showing the relationship between learning and simulation games (Martin & McEvoy, 2003; Kendall & Harrington, 2002; Walters, Coalter, & Rashed, 1997), but it is not something we aim to generalize from this study. Instead, we try to identify how simulation game can be better used when it comes down to the education.

A lot of effort was put in carefully collecting, storing, interpreting, and analyzing the data collected in order to ensure high validity and reliability of this study. The data collected through questionnaire was double-checked after entering and also the interview transcripts were carefully interpreted. The external validity with respect to the generalization of the results is limited to some extent; however, the internal validity is directly ensured by our actions mentioned above.

3 Frame of reference

The following chapter aims at building the literature framework for the analysis and consists of three big blocks – simulation games, learning and games as a learning tool. It starts by discussing concepts of game and simulation separately and moves towards simulation games by focusing on business simulation games and use of simulation games. Following, advantages and disadvantages of simulation games are presented. Further, the learning theories and approaches are discussed as well as several learning tools presented. The chapter is finalized by examining simulation games as a learning tool.

3.1 Simulation Games

3.1.1 Games

There are numerous definitions of what a game actually is. Michael (2005) defines games as *"voluntary activity, obviously separate from real life, creating an imaginary world that may or may not have any relation to real life and that absorbs the player's full attention. Games are played out within a specific time and place, are played according to established rules, and create social groups out of their players."* (Michael, 2005, p. 19)

Games as such have a long history. Mainly people see them as entertainment tools; nevertheless, they may also have an educational purpose. Games that at first are aiming for education possibilities (in any form) and only after that introduce entertainment factor Michael (2005) calls "*Serious games"*, because they educate, train and inform. He states that teaching does not consists just from facts and practice, instead serious games can be used to inform players about some issues, for example, environment, health, political views, etc. Furthermore, in the literature there is a continuous support towards games as a valuable and also enjoyable tool that can be used for the educational purposes.

3.1.2 Simulations

In the literature some authors are discussing issues related to the simulations, others refer to the simulation games. Nevertheless, they all can be narrowed down to the same type of application – tool that is simulating some kind of action in some particular environment. In many cases term 'simulation' is used when authors see it from mathematical or scientific perspective, whereas term 'simulation game' is more common when it comes down to the business. Still, when business simulation games are discussed, some authors refer to them as simulations. In this study we will try to stay with the terms other authors have been using in their studies. However, the focus of the study is to consider the computer-based business simulation games and refer to these as simulations and simulation games interchangeably.

Various definitions are noticed also by Rutter and Bryce (2006) who indicate that even the word 'simulation' has numerous meanings. In their book they refer to it as a particular kind of digital software*, "a mathematical or algorithmic model, combined with a set of initial conditions, that allows prediction and visualization as time unfolds"* (Prensky, 2001:211 cited in Rutter & Bryce, 2006, p. 140). At the same time Zhang (2000) leaves out the time aspect which was mentioned by Prensky in Rutter and Bryce and writes that "*Simulation models use computers to mimic the behaviors of complicated systems to gain insight into the performance of the system"* (Zhang, 2000, p. 432). Zhang (2000) indicates that simulations to a large extent are used as good tool to help

practitioners "*to make business decisions, design control policies, and determine how some aspect of a system should be created or modified"* (Zhang, 2000, p. 432).

According to the glossary in the book of Dovey and Kennedy (2006) they do not see the link to the real world within the simulations. Instead, simulations are seen mainly as tools for complex problem solving.

> *"Simulation is a system of representations which has no real world referent. Derived from the computer science and critical theory through the legacy of Baudrillard. In computer science, simulation is able to predict the behavior of complex systems which cannot be directly observed and is now widely used alongside theory and experiment as a method for future production of knowledge. Baudrillard has argued that 'signs' no longer stand for reality in the world but themselves constitute world. Computer games combine these two strands of meaning insofar as they graphically represent environments which usually do not exist in the world and which are generated by complex dynamic system of the game engine."* (Dovey & Kennedy, 2006, p. 148)

At the same time Jones (1980) describes the simulation as a case study which actually has its participants inside. He discusses simulations in general not bringing up the issue of technology and as a distinguishing feature for simulations from case studies he brings up the interaction.

Romme (2003) in his work on "Learning outcomes of micro worlds for management education" refers to the computer-based simulations as micro worlds. He defines micro world as *"simulation in which people can participate by running experiments, testing different strategies, and building a better understanding of the aspects of the real world that micro world depicts"* (Romme, 2003, p. 52). Thus, micro worlds are able to compress time and space and enable experimenting and learning when the consequences of some decisions and actions can be seen only over time. To our opinion, this definition is rather basic, but at the same time very well describes the simulation games as such, especially the ones that can be found in the business field.

3.1.3 Simulation games

According to Jackson (2004), historically, simulation games have been used in *"specific scientific disciplines (engineering, bio-sciences) and for high-risk occupational training (military, aviation and training)"* (Jackson, 2004, p. 22). However, today these are not the only applications of simulation games. Rutter and Bryce (2006) list down several situations where computer simulations are applied: market fluctuations predicted by economists, analyze demographic change with respect to geographic factors (Rutter & Bryce, 2006). Another example can be given by referring to Cottam and Preston (1997) who analyze crisis simulations and argue that those are *"laboratories where political variables emerge and interact"* and where this interaction can be also observed (Cottam & Preston, 1997, p. 196). Moreover, they state that these simulations allow controlling for number of variables that interact at the same time, thus implying some measurement possibilities. Additionally, Michael (2005) indicates that serious game industry is growing fast and it has a lot of opportunities. He supports it with mentioning technology research firm IDC that has predicted that by 2008, 40% of U.S. companies will include serious games in their training programs (Michael, 2005). Although this is data about U.S. and one should be aware that in many cases, especially with respect to technology, this part of the world usually runs few steps a head Europe, it still shows rather high growth possibilities for the serious games in the market.

3.1.4 Business simulation games

Gilgeous and D'Cruz (1996) notes that business and management games gained their recognition during the First World War and since then these games have been facing continuous development. According to them, the majority of games have been influenced by two games. The first one was a computer-based game developed by American Management Association in 1957 and was published in the book Top Management Decision Simulation. The second one was developed by Andlinger around the same time and it gained its popularity after its publication in Harvard Business Review. Since then many universities and graduate schools started to develop their own games.

Another type of simulation games within the business field are examined by Martin and McEvoy (2003), namely they explore the use of hotel operation training simulation which applies to tourism and hospitality education. They look back at the history of these types of simulation games and indicate that in this field there have been simulations already since late 1960s. As the first ones they identify CRASE (restaurant simulation) and CHASE (hotel simulation) at Cornell University where the second one implied limited student-computer interaction.

In their research on business and management games Gilgeous and D'Cruz (1996) bring forward several definitions of these games proposed by other authors. They suggest that rather good but vague one is offered by Gibbs *"an activity carried out by cooperating or competing decision-makers, seeking to achieve, within the rules, their objectives"* (Gibbs cited in Gilgeous and D'Cruz, 1996).

Fripp (1997) discusses business simulation games and states that most of them actually have the same basic structure. They are designed so that they would represent real or hypothetical business environment where players can compete. In these games players are usually developing products or services and they have to make different decisions and actions concerning these products (Fripp, 1997). Furthermore, Michael (2005) states that it is very seldom when simulation games are actually 100% accurate; nevertheless they allow simplifying some abstract problems so that it is easy to understand even to a newcomer in some field.

3.1.5 The use of simulation games

Gilgeous and D'Cruz (1996) identify many business divisions across many industries that use games. Several companies (i.e. Bank of England, E&Y, British Gas, The Body Shop, etc.) and most educational institutions that are teaching management, business or economics are among the users. The authors suggest that there is large potential for the game suppliers, but in order to succeed, they should change attitude in this area towards games.

Naish (2006) discusses how recruitment sector is using the games where companies mainly use games on their websites in order to recruit people. The objectives behind this are being ahead of other companies with respect to recruiting the best graduates. Further, this allows them to build a social network among the students who talk about the game, thus enabling company to be successful with its viral marketing. And finally, for applicants, this kind of game usually gives a rather realistic preview of the possible job. Nevertheless, the games do not select the applicant which will get the job. Instead, it allows the company to get to know the applicants better with respect to their motivation, strategy, analytical thinking, team-working skills, etc. As a result, more appropriate people are recruited for the particular position and company.

This can be broadened by looking at work of Funke (1998) where he assesses computer-based simulations for selection and training for the jobs with respect to complex problem solving (CPS). He argues that computer-based scenarios are very attractive for evaluation purposes because they permit to design complex scenarios that may be very dynamic and they respond to the decisions made by the player. He also notes that the learning effect for these kinds of simulations is maximal for the developer and lower for the ones who play them.

Continuing the business perspective and how simulation games are applied within the companies, Solomon (2002) refers to IT executives who use simulation tools stating that they enable employees to better align their work with business strategies. They help employees to change the way they are thinking towards more cost-effective work and also encourage them to come up with new revenue-generating ideas. Although IT workers are very good in their field, they are limited to the ability to see the picture as a whole. Thus, simulation tools allow them to see company from macro perspective.

Moreover, in some companies simulations have shown ways to balance risks and rewards and thus also identify investment possibilities for particular project and returns it may generate. In another company simulation helped to identify key success factors in some areas of business. (Solomon, 2002)

3.1.5.1 The users of business simulation games

In the research about serious games the survey indicated students as the target audience for serious games projects (Michael, 2005). Nevertheless, simulation games are used also within the companies. For example, Gilgeous and D'Cruz (1996) identified three: management training, student training, and general employee training. Their research indicates that the last one is the most rarely used. Moreover, they found out that many of users actually are not aware of the full scope of the games.

3.1.5.2 When and why the games are used

With respect to reasons behind the use of simulations, Jones (1980) argues that they are to a large extent case dependent. For example, they can be used to develop communication skills, for linguistic practice, behavioural and organizational issues or as an icebreaker. (Jones, 1980)

Among the most popular times when to use a game was breaking up the training session, to start a conference or sometimes finish a conference. Mostly they are used in training sessions, but sometimes also in workshops and lectures. Additionally, over 50% of their sample used games on a yearly basis and almost 30% on a monthly, the rest on weekly basis. The most popular reason for using the simulation game is in order to keep the participants interested. Further, some games are identified to be a good tool for encouraging the interaction among participants. (Gilgeous and D'Cruz, 1996)

Additionally, in the majority of cases companies had relied on "in-house" developed games, but still some used also games provided by suppliers. Gilgeous and D'Cruz (1996) argue that users might be more oriented towards custom-made games, so suppliers who are able to see this and fulfil it, can have many opportunities in the market. Companies tend to use mostly games of a particular business environment or particular management skill, but the less popular are games on business or practical skills. Thus, *"the games often used are custom-made to be relevant to the company's particular business environment"* (Gilgeous & D'Cruz, 1996, p.

37). Furthermore, most of the users think that good game should encompass several elements: fun, education, and competition.

Jones (1980) points out that not all simulations are appropriate for everyone and every situation. Thus, teacher has to be careful when choosing the simulation and when presenting the simulation to students as well as he/she should definitely try out the simulation before introducing it to the class. It is rather important that students accept their roles and do not perceive this as just having fun otherwise it may not bring the expected results.

3.1.6 Benefits of games

Many studies concentrate on the benefits of computer-based simulation games (Jones, 1980; Gilgeous & D'Cruz, 1996; Fripp, 1997; Funke, 1998; Kendall & Harrington, 2003). To our opinion, in many cases the findings are similar, only the way they are prioritized may differ. Nevertheless, some of the previous findings are also case dependent and may not be generalized for all simulation games. The rest of the section will present some of the advantages of the computer-based business simulation games that we have identified in the literature.

One of the main advantages of the games is that they allow active participation. Player instead of just hearing and getting instructions how things should be done, can practice it him/herself. Gilgeous and D'Cruz (1996) propose that the game can be used to develop completely new skills or as an addition to already existing teaching tools. They list down numerous benefits of games to both users and participants. For example, game allows the user to illustrate some particular point and encourage participant learning from experience. Additionally, games are seen to be cheaper than "on-the-job" training. Further, games have higher personal involvement; they allow practicing decision-making techniques and analytical techniques. What is rather important aspect is the ability of games to bring feeling of reality and real-life issues to the player and have also feedback on decisions made by the players. (Gilgeous & D'Cruz, 1996)

Somewhat different view is presented by Fripp (1997) who states that in the literature one of the main advantages for the use of simulation games is that they are more realistic than alternative methods and some authors have also been trying to determine the extent to which simulations are able to capture the essential features of real-world. Thus, he points out that simulation are among the most realistic *off-the-job* training possibilities. Fripp (1997) also refers to UK survey that had identified five advantages for simulations. Firstly, the *motivation* as simulations stimulated students more and made the learning process more enjoyable. Secondly, simulations are good for developing *team-working* skills. Thirdly, simulations offer *risk-free environment*, thus enabling participants to try out actions and make decisions they would not make in the real life because of their high cost. What is more, if wrong decisions are taken, they are not as expensive as in real life. Fourthly, simulations offer *variety* for study techniques which differ from the traditional learning methods (like reading book). Finally, simulations allow *experiential learning* because it can provide feedback on actions person has taken in the game; enabling the players to see the consequences of the decisions made. (Fripp, 1993 cited in Fripp, 1997)

In addition, Jones (1980) lists down several advantages of simulations: motivation and high degree of involvement, realism, use of authentic materials (instructions and simulation documents), encouraging 'reading between lines' as majority of simulations are open ended, and mechanism of correction and guidance.

At the same time Funke (1998) identifies several advantages for the use of computer-based simulations during his previous research and when analyzing complex problem-solving simulations. Namely, games:

- allow constructing complex scenarios that are dynamic over time and create new demands on the player;
- tolerate for economic presentation of complex scenarios and process oriented data registration;
- allow for fast calculation of results;
- permit to present complex scenarios in more regular way;
- are more attractive for the players;
- provide an opportunity for practice;
- provide with augmented feedback;
- increase motivation;
- support adaptability of training objectives.

We also refer to the study carried out by Frauenheim (2006). He indicates that some of the benefits of computer games and simulations for training are higher willingness of people to participate as they are having fun, possibility to have safe simulations of situations that would be dangerous in real life, and it can increase retention.

3.1.7 Disadvantages

Although there are numerous advantages that computer-based simulation games can bring, there also exists some criticism with respect to them.

Funke (1998) has found several disadvantages with regarding computer-based scenarios. For example, in many cases these scenarios are so complex that even the developer is not able to say which the best or correct solution is for it. Further, many computer-based simulations "*produce a lot of behavioral data for most of which the psychological interpretation may be unclear*". Next, it is rather hard to evaluate computer-based simulations with regard to the validity of the simulated domain. Moreover, the results from these simulations are not comparable between several subjects because of the dynamics and differences between situations they have been facing. Additionally, he sees computer-based simulation games to be poor on the social level as most simulations demand decisions made by a single subject, instead, in real life, there is much more interaction. Finally, Funke (1998) states that computer-based training applications require more data on their usefulness in order to be able to show their value in the practice of management.

In addition, computer-based simulation games are just another feature in the digital world and there might exist threats as for any application which is technology intensive. For example, Frauenheim (2006) notes that there still exist lack of confidence in success of games as, for example, e-learning was not as successful as expected in the education and also the perception of game as being just fun tool threatens the emergence of games in the business.

3.2 Learning theory

3.2.1 What is learning?

Learning is widely used term and at the same time it is rather hard to define. The Oxford English Dictionary defines learning as to get knowledge of a subject or skill in an art by study, experience or teaching. Newell, Robertsson, Scarbrough & Swan (2002) discuss the structuralist perspective on knowledge. From this perspective knowledge is perceived as "*a discrete, objective, largely cognitive entity*". Within this perspective knowledge is divided into two types: tacit and explicit knowledge. Tacit knowledge is known to lie within the person but is extremely difficult to articulate. This form of knowledge is often referred to as "know-how" and resides in our heads and in our practical skills and actions. One example of tacit knowledge is how we ride a bike – anyone, who learns it, knows how to do it, but still it is hard to describe how exactly it is done. Explicit knowledge, on the other hand, is knowledge that can be readily codified and communicated to others. It can be noticed as the instructions person needs to be able to ride the bike, such as 'put your feet on the pedals and pedal'. It is stated that tacit and explicit knowledge is constructed mutually. Further, the complexity of tacit and explicit knowledge is vast and will not be furthered discussed in this thesis. It is mentioned as it is a large part of the phenomenon of knowledge and to give an insight for the reader in the learning theory.

As it is known that people do learn, the opinions on how it actually occurs have been varied. Marton and Both (2000) present theories about learning that were set centuries ago. Menon is named as one of the first who introduced the paradox of learning. He questioned how one can search for something when he/she does not know what is. Platon replied to this statement by claiming that the soul is immortal and will get new life in a new man and that the knowledge it possess will follow. The knowledge is then forgotten by its owner, but will later be remembered. Marton and Both (2000) state that first after twenty-three centuries after Menon's paradox that learning actually became an object for science. Herman Ebbinghaus studied the memory as a pure form free from meaningless associations. He created a list of meaningless syllable pairs and tried to memorize them and say the previous pair as he saw the next pair. This study was published and is seen as a study in learning in terms of getting better and better in remembering due to practice. (Marton & Both, 2000)

Furthermore, Marton and Both (2000) discuss Ivan Pavlov who studied a completely different form of learning. Pavlov studied how different stimulus of people and animals are triggered at different situations. The learning has made the subjects to predict what is to happen. The behaviourism's father John Watson used the same principle when he taught a child to develop a fear for fur-animals. He did this by creating a loud sound at the same time as the bunny was presented. The sight of the bunny became a conditional stimulus that triggered a conditional response of fear also known as classical conditioning. Burrhus F. Skinner was studying learning in terms of to what extent a certain behaviour appears as the function of what earlier has become the consequence of just that behaviour. It is more likely that a specific behaviour comes up if is followed by a reinforcement, meaning a consequence that is desirable from the objects point of view. This type of learning is called operational conditioning when an individual is reinforced or punished to affect its surrounding. Skinner, Watson, Pavlov and Ebbinghaus all saw learning as a change in behaviour that is studied as a function of practice that are all probable consequences of conditional and unconditional stimulus. Marton and Both (2000) also mention Jean Piaget who believed that knowledge exists somewhere out there already shaped and made and that one some-

how takes it in from the surroundings. This theory differs entirely from the beliefs such as Palton's that were mentioned earlier. According to Piaget, the individual constructs knowledge through his/her actions and through interaction with his/her surrounding. Either the individual adapts to the surrounding or the surrounding is adjusted to fit the individual.

Read and Kleiner (1996) write of a research that learning occurs when the person gets rewarded for his/her results. This implies that two important factors are in place when training. First, an active participation from the player is important. If the learner does not take in the information that is presented to him/her, no learning will occur. How to take in the information may differ from reflecting over the information to repeating it. Secondly, people are more willing to learn if there is reinforcement involved. This reinforcement does not have to be monetary; instead acknowledgement and praise might be enough. However, it can also be enough with the internal satisfaction the learner may feel from learning. When feeling internal satisfaction people often feel a need to seek increased satisfaction, which leads to a spiral of continuous learning. (Read and Kleiner, 1996)

3.2.2 Different approaches to learning

Though there are many suggestions on what learning is and how it occurs, different approaches of learning can be identified. Lainema and Makkonen (2003) present four different ways of learning: the behaviourist, objectivist, cognitive, and constructivist. Behaviourists are interested in a student's behaviour in relation to teaching; constructivists are interested in the mental processes which affect the behaviour of the student. A traditional lecture is based on the behaviourist approach whereas project and coursework is typical constructivist learning. Computer-supported learning is often linked to behaviourism and constructivism. Programmed instructions, however, are more associated with objectivism and behaviourism, as it emphasizes learning by manipulating learners behavioural patterns.

Cognitivists emphasize learning as the construction of knowledge and the development of the personal knowledge presentations of the learner (Lainema & Makkonen, 2003). A cognitivist way of solving a problem is having the need to use a model he/she has used before to be able to solve the problem. By using the right model the problem can be understood, dealt with and finally be solved. (Marton and Both, 2000)

It is said that the concept of the mind was reintroduced with cognitivism. Shepard (2000) describes cognitive learning as "…*an active process of mental construction and sense making"* (as cited in Rudell & Unrau, 2006, p. 1620). Cognitivists believe that the existing knowledge structures and enables or hinders new learning. It is assumed that one develops his/her 'expertise' in the field of study as the principled and coherent way of thinking and representing problems, not just by gathering information. As cognitive theories are somewhat linked with constructivism, Shepard (2000) presents a number of cognitive and constructivist learning theories that are the same. Intellectual abilities are said to be socially and culturally developed. It is within a social context that learners construct their knowledge and understandings. Any new learning is shaped by prior knowledge and cultural perspectives. Further, any intelligent thought is said to involve 'metacognition' or self-monitoring of learning and thinking. Achieving deeper understanding is done in a principled way and it does support transfer. Dispositions and personal identity are decisive for the cognitive performance.

Duffy and Jonassen (1992) present 'constructivist cognitive science' discussed by Bednar, Cunningham, Duffy and Perry (1992). Within this view the learning is seen as a construc-

tive process in which the learner is building an internal representation of knowledge "*...a personal interpretation of experience."* (as cited in Duffy & Jonassen, 1992, p. 21). The structures and linkages from this representation together form the foundation to which other knowledge structures are added on. Learning is seen as an active process by constructivists in which the meaning is developed on the basis of experience. It is said that the conceptual growth comes from sharing multiple perspectives and the simultaneously changing inner illustrations through cumulative experience. The main point that needs to be achieved is that learning must be situated in a rich context. It needs to reflect a real-world context for constructive processes to occur and occur in environments beyond school or training classroom. Bednar et al. (1992) set key factors of constructivist thinking as learning through cognitive apprenticeship, reflecting the collaboration of real-world solving and using the tools available in problem-solving situations.

The constructivism approach of learning is well suited for business simulation games as this approach emphasizes realistic settings and a student's own contribution to learning (Lainema & Makkonen, 2003). As cited by Duffy and Jonassen (1992), Perkins (1992) state that a central vision of constructivism is the notion of the organism as 'active' and not just responding to stimuli, but engaging, grappling, and seeking to make sense of things. Learners do not just take in and store information; instead they interpret, elaborate, and test their interpretations. Further, Perkins (1992) set the basic goals of education to be rather simple. Retention, understanding, and active use of knowledge and skills are set as the educational strives. These three, however, are hard to achieve. Perkins (1992) acknowledges that there are challenges of retention: understanding and active use of knowledge and skills confronts educators today on a massive scale. It is also aggravated by problems of learners "at-risk", the underfunding of education, the aging tutors with lower technological skills and so on.

3.3 Games as a learning tool

Simulation games are somewhat new learning tool that introduce features traditional learning tools do not allow for. Tompson and Tompson (1995) use ten criteria to evaluate the difference between use of computer-based simulation for a group project and traditional group project among university students. The criteria are: interest, novelty, motivation, effort, business relevance, major relevance, course relevance, course improvement, learning, and difficulty. From other studies they have drawn several points that favour towards use of computer-based simulation for group projects instead of traditional methods. Namely, computer-based business simulations allow students to experience zero-sum competition during the simulation game and simulations encourage experiential learning and motivation. On average computer-based simulation games received higher scores than the traditional way of doing group projects. Students indicated that they were more interested and motivated and put more effort to the simulation. They noted that simulations are more novel and on average they improve the course. Further, they do not identify big differences with respect to the demographics (gender, age, etc.). Still, they saw that male evaluated computer-based simulations more positively than female. Thus, these authors conclude that interest, motivation, effort and learning increases for students when they use computer-based simulation in the course.

Although it is clear that simulation games are different from other learning tools one might consider if they improve the learning. Martin and McEvoy (2003) state a fundamental question to answer if simulations provide more satisfying learning experience. They cite Rosenorn and Busk who state that simulations build an environment that is suitable for organizational learning. This is broadened by Wenzler and Chartie who argue that the most

effective approach for facilitating organizational learning is development and implementation of games and simulations. Furthermore, they support it by citing Faria who indicated that use of business simulations games in the academic field and industry is in continuous growth. Walters, Coalter, and Rashed (1997) believe that simulation games allow students to have some degree of realism in their actions and propose that *"business games and simulations are effective tools for exploring strategic alternatives and their consequences"*. Furthermore, the satisfaction with the game does not depend only on the game or how the game is administered. Instead, psychological and team factors to a high degree can influence the student satisfaction level with the game. If there was not a good fit between team members and strategy with individual's profile, the satisfaction level declined. As well as group consensus lead to higher satisfaction with the group.

Tonks and Arbitage (1997) discuss the theory of disappearances in what is intended learning, apparent and actual learning. This leads to a possibility that students may acquire knowledge outside the intended learning outcomes for the simulation. Actual learning outcomes will be factors which the student brings to experiential learning and these could concern prior learning experiences and how the student view such learning in relation to other course elements. However, Tonks and Arbitage (1997) discuss theories that data on learning from simulations is limited both in quantity and quality, which applies also to the other traditional learning methods. Thus, they note that from a simulation point of view a model of experience-based learning is especially useful in two ways. First, it enables students to gain knowledge, competence and skills. Second, students learn to craft their own mental model, try it out, and evaluate their results. Further, Tonks and Arbitage (1997) discuss reflection and criticism as desirable features when learning. In contribution to that, general literature on management learning often talks about three learning domains as cognitive, affective and skills. As Tonks and Arbitage (1997) argued, other authors have recognized that the specification of learning from simulation work is problematic; however there are many authors that believe differently. There are authors that believe that simulation covers all three areas of learning. This view is supported by others that identify the learning outcomes, which are commonly sought in the simulations. However, Tonks and Arbitage (1997) states that it is still unclear if learning through simulation is more effective in some domains compared to alternative learning methods. They argue that the specified learning outcomes will depend on the cultural setting, the institution, the subject matter. It also depends on how the learning theory is explicitly or implicitly adopted by the tutor in curriculum design and course facilitation.

One benefit with simulation games is according to Romme (2003) that the business simulation allows building synergies between thinking in the theoretical framework and dealing with the actual situation. Nevertheless, Funke (1998) argues that ability to achieve the expected goals does not depend only on the learner, but to a large extent depends from the activities taken by the teacher. Moreover, Martin and McEvoy (2003) studied a simulation game and found it effective with respect to applying several concepts and principles and also this simulation was evaluated to be more effective than lectures and case studies and encouraged testing for ability of critical and analytical thinking. They state that computer-based simulations are designed to provide a real-world edge that is not available in traditional training forms like lectures and case studies. Thus, with respect to tourism organizations, it allows to *"develop an understanding of operations, tactics and strategy, while recognizing the potential conflicts among the various stakeholders"* (Martin and McEvoy, 2003, p. 336) Gilgeous and D'Cruz (1996) argue that the purposes of the use of games are to maintain interest of the audience, their effectiveness, to teach some particular concept, and because they are enjoyable. Additionally they list that sometimes games are used to have fun, teach some skill or

to convey a difficult concept. Nevertheless, Jones (1980) argue that introducing the simulation to the students will not give them such a freedom as one might imagine and they will not start to act inappropriately and misbehave with respect to the class. Additionally, Gilgeous and D'Cruz (1996) propose that games have some benefits over traditional teaching methods (like lecture, case study, and role-play). Nevertheless, they should not be used as the only teaching tool in the course. The best approach is to combine it with the traditional teaching methods.

As the main objective for micro world simulation in the field of education, Romme (2003) proposes motivation and assistance for the deeper and more integrated understanding of students. He states that it is important to focus on teaching and assessment methods that encourage active and long-term engagement with learning tasks. Further, it is important to have frequent and tailor-made feedback on progress. From the results in the study, author concludes that by effectively combining lectures, case studies, readings and micro worlds, students can be stimulated towards deeper learning. Teubner (1992) proposes two reasons for the application of computers within the education field. Firstly, world is becoming more and more complex and specialized that sometimes is referred as information or knowledge society and it requires continuous development. Secondly, *"computer systems are flexible and cost effective; computer-based teaching is accessible at any time, (nearly) any place and enables individual, self-responsible and anonymous studying"* (p. 201) He also states that computer-based training is a way for student to practice and deepen his/her knowledge. Further, teaching software aims at transferring knowledge, check on the achievements of teaching goals and allow for individual repetition and explanation. Heil (1992) states multimedia application to be a good tool for universities to utilize knowledge facilitation as they can be used for simulating dangerous procedures. Further, Heil (1992) actually considers training-, teaching-, and learning-systems as the most interesting elements in the field of computer-based training.

4 The simulation games identified

Since there are many business simulation games on the market and the respondents in this study were geographically spread, number of different simulation games have been used by them. Every simulation game used by respondents will be presented shortly in the following chapter.

4.1 Marco Polo

Marco Polo has been used for several years by one of the universities in the course of business management (Företagsstyrning). Marco Polo is a business simulation game that is also known as an adventure game. It was introduced to the market in 1995 and is developed by Atari Europe S.A.S.U. The player acts from a third person perspective as a merchant that travel in Asia. The goal of the game is to earn as much money as possible by making business in the native market. There are also a number of missions that the player has to accomplish. (MobyGames, 2007)

Marco Polo might be seen as a 'light' simulation game in a sense that it is not based on a complicated economic model and the variables to work with are not too many. The interface is seen as to be easy to use and the main strategy seems to be to buy low and sell high elsewhere. There is a heavy use of multimedia in Marco Polo with video sequences and simulated encounters. Also the historical events in the game are historically accurate and the background of the real world's Marco Polo is presented which gives the game a realistic appearance. (Game Downloads, 2007)

4.2 Webpolo

In later years the same university in the same course used a simulation game called Webpolo, which is based on the previously mentioned simulation game MarcoPolo. Webpolo is an interactive business-simulation where strategies and ideas meet in a simulated "market business game" and where the participants get knowledge in business idea, accounting, strategy, marketing and organization in a simulated environment. (Webpolo, 2007)

Because of Webpolo is web-based it can be used in a concentrated way with all participants in one and the same place as well as in a distributed way with the participants spread both geographically and in terms of time. Webpolo is played by having 4-8 management groups take over an identical business that they are to lead during a number of simulated years. During the period the group has to take decisions about use of capacity, personnel development, pricing and marketing. While the market is affected continuously by the participants and that every round played is monitored by a game-leader every round is unique. (Webpolo, 2007)

4.3 Zimulus Enterprise Game

Zimulus Enterprise Game is a web-based simulation game developed by PIXE Learning that is used for the first time this year by another university in the course called Marketing A. In the game the participants get to run a 'virtual company' for 12-36 months. During the game the participants are trained and tested on their marketing, product planning, pricing and business skills. To be successful in the simulated market, customer expectations for the companies' product must be met. It must also be ensured that the enterprise can compete on price with its competitors. The workforce must also be highly motivated to be able to match consumer demand with production. (Zimulus, 2007)

The Zimulus Enterprise Game is said to give the participants a good insight in how a business is driven in real life and what needs to be done to be a successful business. The game is said to be an excellent tool for people starting their own business, entrepreneurial educations, business- and marketing courses in universities and for people interested in getting a better understanding about business related issues. (Zimulus, 2007)

4.4 Markstrat

Markstrat is a business simulation game that is said to 'move as fast as the real world' that have been used by the third university for 5 years in the course of Market Strategy A. The initial version of Markstrat was developed already from 1974 to 1977 but was introduced to the market for computer use only in 1984 by Stratx Simulations. In Markstrat the participants work in groups of 3 to 6 participants and each team competes against each other. The goal is to successfully run their industrial company over a multi-year period. (Stratx Simulations, 2007)

The participants need not only tactical skills but also a long-term strategy to be successful in the game. Because of the long time scheme the participants are forced to plan for long-term objectives as well as short-term profits. Every team's actions influence the simulated market therefore a competitive analysis is a must. The participants also need to deal with product launches, sales and distribution strategies, research and development (R&D) projects, positioning, pricing and manage their own product portfolio. (Stratx Simulations, 2007)

4.5 MINIMAX

The Minimax simulation has been used by the next university since 1989 in their course of business analysis and leadership (Ekonomisk analys & styrning). The game introduces the basic concepts of business practice such as profit, cash flow, production, promotion, pricing and market positioning. The participants play in teams of 4-6 persons that act as board of directors of a simulated business. They need to make various decisions concerning capital investment, pricing, marketing, personnel, production, purchasing and will receive feedback after each set of decisions. (British Council, 2007)

From the start each team has a great idea but very little money. The products need to be manufactured and sold when having a competition with other companies. The main goal is to be the most profitable company on the simulated market. (British Council, 2007) The purpose of the game is to discover connection between investment, production, advertising and pricing. Nevertheless to show the importance of factors such as the awareness of competitor's strategies and having correct cost calculation. (Stockholm School of Economics, 2007)

4.6 PharmaSim

Finally, one of the universities has been using the simulation game PharmaSim for 4 years in Marketing Management as indicated by an interviewee. The game was introduced to the market in 1990 by Interpretive Simulations. PharmaSim is a computer-assisted exercise which purpose is to make the participants learn about marketing management and decision making. PharmaSim focus on the four P's of Marketing: Pricing, Promotion, Product and Place. The participants get introduced to the concepts of brand equity and marketing plan-

ning for multiple product lines. PharmaSim also covers areas such as segmentation, positioning and management of a portfolio of brands. There is also a focus on how to motivate consumers and channel partners. (Interpretive Simulations, 2007)

The participants act as a brand manager in a simulated pharmaceutical industry. As the participants acts as members of a marketing management team, they manage the marketing mix for their products. They also get to reformulate their brand, introduce a line extension, and launch a new product. (Interpretive Simulations, 2007) PharmaSim allow participants to gather plenty of experience in working with concepts and tools of marketing. It also helps the participants to form an understanding of how marketing decisions need to be shaped to be eternally and externally consistent. (Iowa State University College of Business, 2007)

5 Empirical data

The following chapter will present information gathered during the interviews with teachers. It will also present the results gathered through the questionnaire sent to the students as well as notes and reflection on the class observation. Also a summary of student opinions from course evaluations will be given.

5.1 Interviews with teachers

This section will be devoted to the results from the semi-structured interviews with the teachers from different universities. At first, the responses to the background questions will be presented. This will be followed by the answers to the main questions that are linked with the research questions

5.1.1 Background questions

During the interviews teachers were asked several background questions with respect to their teaching experience and the use of the game. Also the games that are used by the teachers were specified. Please note, that these games were discussed already in the previous chapter.

Six teachers interviewed during this study were from 5 different universities, namely, Stockholm School of Economics, Jönköping International Business School, University of Stockholm, University of Uppsala, and University of Dalarna. Their experience in their respective universities varies over time. One of the teachers is working in that particular university just for the first year although this teacher has been working in another university for about 6 years before moving. Another teacher is working for the second year. At the same time another teacher has 19 years experience as a teacher in the current university. The rest has approximately 5-6 years experience in particular university.

With respect to the courses where these teachers have been using simulation games, they are of several types: marketing, marketing management, market strategy, business management, and business analysis and leadership. Similarly to the teacher experience in particular university, also their experience in teaching the particular course, which at the moment involves use of simulation game, varies from 1 to 14 years as well as the time frame when the game has been used is wide: from 1 to 14 years.

When asked, how they decided on introducing the game in the course, majority indicated that it was their own (in case of being a course responsible) or course coordinator's decision. Representative from one of the universities indicated that there the course was actually built around the simulation game. In another case course coordinator had played the game himself when he was a student, so he decided to introduce it also to his students. For the newly introduced games, one of the teacher got advice from a colleague, another one came across the game on her own and is at the time using beta version of the game. Unfortunately, in one of the universities the game was introduced before the teacher started to work there, thus he was not able to indicate the reasons for introducing the game in the course.

Further, teachers, who chose to use vendor developed computer-based simulation game got some guidelines from the game developer on how to use the game and what kind of questions to ask for the students in the assignment. It is noteworthy that the teachers found these guidelines very useful. In the case of using beta version of the game Zimulus,

due to the fact that the game is still being developed, the informative materials provided for the teacher were rather limited. Nevertheless, teacher was promised to receive some more information in future. In the use of PharmaSim, teachers used the guidelines for getting some ideas on how to develop the assignments, but they were still formed by teachers. In case of MINIMAX and Marco Polo (WebPolo), teachers were not provided with any guidelines for student assignment. Markstrat is web-based game, thus the teacher and students additionally to the good literature coming with the game receive a good web-support from the developers.

At the ending part of the interviews, teachers were asked if they think that the simulation game they are using could be applied also in other area. All of them answered positively to this and one of the teachers is doing this himself – using Marco Polo in the leadership course. Additionally, teacher, who uses MINIMAX game, indicated that his colleague uses the same game in other courses in the university. Also, when discussing PharmaSim simulation game, teachers opined, although it is a game oriented towards marketing, it could be used also for courses as finance and strategy, and operations. Moreover, in the beginning they even thought of giving this game to the university personnel to make them aware of different issues brought up in this game. Additionally, one of the teachers proposed that companies could use this game to make the rest of the people in the organization understand that marketing is not just about making a nice advertisement, it involves much more: *"I don't think that there is just one department doing the marketing. But there is a department called marketing department and obviously they should know. But other departments may not know exactly what the marketing department is doing, they just say, oh, yea, its marketing, but they do not realize that it is not that easy and it is rather complicated."* Furthermore, the teacher, who is using Zimulus game for A-level course in the marketing, argued that it could be used also in the next level course or in distance learning programs.

5.1.2 Questions answering main research question

The main part of the interview questions aimed at answering the research question if simulation games can be a good tool for learning. We were interested to see if the teachers themselves thought that the game covered the aspects of theories and literature used in the course. It was also of interest to see teacher's perception of the game as a learning tool. The overall response was positive in terms of the game to be seen as a good additional learning tool for learning the theories and models of the course. The teacher using Webpolo indicated that "*It is the course*" as the game is such a big part of the course that the course would not exist without the game. Another teacher emphasized that the simulation game helps students to understand the theories learned and give them practical experience. Further, one of the teachers who was using the simulation game for marketing course stressed that the game really teaches students marketing as it covers the 4Ps and gives students real practical effect. In another interview it was stated that the game teaches the theories and models of the course; nevertheless it also covers other business related issues that are not covered in the course.

Further, we were interested to see if the teachers thought that the simulation game cover all parts of the course. It can be seen that the overall impression was that the games do cover many but not all aspects of the course. In the marketing courses the games seem to cover most of the parts of the course but in more broad business courses this is not the case. As a following question the teachers were asked if they feel that the simulation game is important for the course. All respondents replied that they think it is an important part of their course. One teacher answered that it is an important part especially as the students gain

practical experience. The teacher using Markstrat noted that game is an 'extremely' important part of the course as it matches excellently with the theory of the course and gives practical experience. In addition, the teacher using MINIMAX supported the importance of the game with students' possibility to get a response from their actions that a normal seminar would not give.

Though the overall impression seems to be positive towards simulation game, we wanted the respondents to name some of the benefits as well as drawback that they have experienced with the game. The list of benefits and drawbacks named can be seen in the following table.

Benefits	Drawbacks
➢ Students becomes aware of the need to know theory in practice ➢ High student involvement ➢ See how theories relates to reality ➢ Reflect on the theories ➢ More in-depth understanding for what they are studying ➢ Gain practical experience and understanding ➢ Students can relate to business decisions ➢ The game becomes a challenge ➢ Stimulated the student to learn, especially the one who is already stimulated ➢ Gives students a taste of what marketing is about ➢ Learn to speak the language of marketing ➢ Deeper understanding in the interplay with the different factors	➢ The competition aspect becomes more interesting than learning ➢ Takes lot of resources ➢ Does not fit everyone ➢ Some aspects of markets are not well represented, like loyalty and brand values ➢ Does not show how to handle all events i.e. bankruptcy ➢ Some of the participants might destroy by being unserious ➢ Some students only see a game not the learning objective behind it ➢ Without tutoring the cause and effect can be misunderstood ➢ The game tend to focus more on only one strategy, low price high sells ➢ Students acts too carefully and take it too seriously and do not take the decisions they actually could in the safe environment

Table 1: Benefits and drawbacks of simulation games examined.

From the literature studied we got the impression that simulation games take up a lot of study time for the students and were interested in the teacher's perception of this finding. The majority of interviewees agreed that the time spent on the game is worth it because of the benefits from having the game. Still, one of the teachers emphasized that other teaching method also should be applied to get the best outcome of learning. At the same time one respondent implied that the way they implemented the simulation game it does not take up a lot of time. Moreover, another teacher indicated that he believes simulation games do not take away time for studying literature as the students probably would not have spend this time reading a book anyways. The teacher stated that having simulation game as a mandatory part of the course allows students to take part of theories and models, which they would not have considered otherwise. Further, another teacher argued that the simulation motivated the students to read more from the literature to be able to solve the dilemmas. Next, we wanted to see if the teachers agreed upon that the simulation game was of value to the study process. The answers received were an agreeing yes. One respondent argued

that it is important for students to not just passively learn but rather to actively reflect and understand. Additionally another lecturer thought simulation game to be an excellent part of the pedagogical process of the course.

Next, we were willing to investigate the teachers' opinion concerning students' ability to learn from the simulation games. The teacher using Wepolo answered that he has not seen any improvements. He claims it to be a good thing since it is not the teacher's job to teach them how to run a business. He claimed the teachers roll is to make students aware of the complexity of the real world. If the students for some reason should solve more problems than usually, he includes new ones to keep the complexity. The teacher using Markstrat said he recognizes that the simulation game makes the student more engaged and enthusiastic towards learning. Moreover, the respondent using PharmaSim argues that before playing the game students speak in a more simplistic manner but after the game they have more questions and more examples to refer to.

To get an understanding on how important the theories and models of the course are to the simulation game being a good learning, the teachers were asked if they think simulation games could be useful outside the classroom. The respondents agreed that the game could be used in other business courses as well as it covers many parts of the business world. However, the teacher using Zimulus argued that it is important to also be a guide in the reflections made, i.e. to help the people playing the game to also reflect on what happened and not just play. The respondent using MINIMAX thought that the simulation game works best if it can be connected to a course and its content. Though one teacher argued that students actually can learn a lot from just playing the game, however it depends on the ambition level of the student to be able to succeed with that.

5.1.3 Supporting questions

As noted before, some of the questions in the interviews were asked to help us with answering the main research question and help to identify the critical success factors

Within this area we asked the teachers a question about what actions teachers took to prepare for introducing the game in the course and how much time did they spend on the preparation phase. Furthermore, we wanted to see the teachers' degree of education on the game and their knowledge of optimal strategies to be taken when playing. It can be concluded that all teachers had played the game themselves before introducing it in the course. While the teacher who is using game Marco Polo was involved also in its development, it was hard for him to evaluate this phase and separate it from the development of the game. Other teachers were eager to share their experience. Concerning the Zimulus beta version, the teacher do not consider herself "well-educated" on this game yet, nevertheless, she played the game and developed her own reflection protocol for students where they have to reflect on their decisions and results. With respect to Markstrat game, the teacher considers himself to be well educated on the game and he used help of his colleague when was learning the game. He also noted that because the results depend on other teams in the game, one can never be sure, how successful he or she will be in the game, although there are some strategies that can be taken. When discussing MINIMAX game, the teacher indicates that he is well informed about the game, though he could not reprogram it again. Furthermore, there is a study carried out about this game that explores the strategies that could be taken to be successful in this game. PharmaSim game was played by one of the teachers during his studies and he replayed it before introducing it. Moreover, other teachers involved in teaching this course also played the game and made a competition between them

to see how well it works. Of course, they also spent a time in reading the guide and playing the game on their own. After these activities they developed two different assignments for students as the game was run in parallel in two level courses by two teachers. One of the teachers noted that learning is the responsibility of each of us and that students should take on this responsibility and learn. The teacher's role there is to support and ensure that learning happens. Additionally, one of the teachers, using PharmaSim now, also tried some other games available before introducing PharmaSim. However, the other games turned out to be too hard for the A-level course. Although, PharmaSim is not graphics-rich game, it was considered to be more appropriate for A-level students in marketing.

Next question addressed the issue of having the assignment for students or if teachers just gave the game to students and assigned them to play it. Out of 6 respondents, only one (teacher of MINIMAX game) indicated that they do not have any assignments for the students. Rather the game is given to the students and they just have to get the highest return on the capital. Other teachers revealed what kind of assignments students have to do. With respect to Marco Polo, they were using several assignments with the game and they were closely related to the content of the game. They did it because *"the course aimed to integrate theory and 'practice'"*. Again the Zimulus game has limited assignment attached to it (i.e. reflection protocol) because of this being the first year when the game is used and having only beta version of the game. What concerns Markstrat game, the teacher has two introductory lectures for student where the game is presented and closer to the end of the game they have rather big assignment which consists of developing good market strategy. Regarding PharmaSim few years ago the assignment was to write approximately 6 pages long paper with 3 different questions and to present it professionally. First question was to reflect before using the case and the actual game on the computer. Second question aimed at student explanation how did they do after each of the years in the game. Finally, the third part was constructed with respect to the end of the game where they had to answer questions such as "*Now you have spend 10 years running the company, what has happened between first and tenth year? What would you have done differently? What is actually the next step for the company?*" Also the students had to make a professional presentation of their work afterwards. This year in first seminar they played the first period together with students, to show them how to play the game and in the second seminar they had to present their work over 10 periods of the game. They had two assignments to hand in this year. First one had to be handed in before they started to play the game and dealt with evaluating the case of a company without playing the game, propose strategies for the company to take. The second assignment was presentation of their results from the game.

We would like to note, that teachers stressed the importance of having an assignment for the game in order to stimulate the learning process. Additionally, as said during one of the interviews: "*Even though it's a simulated environment they have real experience making decisions*". Furthermore, the simulation game allows students to gain something like work experience and build a deeper understanding within the subject.

When asked about different techniques used for introducing the game in the course, only one of the teachers revealed that he has tried three different techniques. First one was straightforward lectures, which were too boring and hard to understand, for students. The other technique was having two practice runs for the students. Here some of the students did not appreciate the fact that they were just practicing and would have to do the game over again. The third one was lectures combined with coaching where student questions are addressed when they come up. The benefit of this approach was that students were not bored. The rest of the teachers have not tried several techniques. As for one of the teach-

ers, he would like to give them to play the game a bit different way, but limited time resources do not allow to do so.

Further, when asked if any changes have been done with the use of the game or assignment, teachers answered positively. Some of them had added some additional things for the students in order to make the game as real as possible and attach issues that are current in the business world: *"I have added features 'outside' the game, i.e. exposing students for e.g. ethical dilemmas, labour union conflicts, environmental hazards and so on…"* The teacher, who is using Markstrat game that is initially for groups and argue that groups are competing with each other, noted that he has tried some other simulations where students compete against computer, not themselves and mostly they have had the game for individual playing. However, these games were not as dynamic as Markstrat, thus he changed back to this one. With respect to MINIMAX, they have not changed it a lot over the last years. They have only *"put more time into different parts of economical terms in the course this time than before"*. With respect to PharmaSim game, teachers have changed over years and they each had their own approach on how the game should be played or assignment designed. Thus, they have influenced each other over time.

Finally, teachers were asked also if they thought that simulation games are appropriate at every age level. Majority of them were positive towards this statement, but it depends on each case and game. One teacher said that there are many different games and difficulty levels for them, thus in most of the situations it would be possible to find a game that would suit it.

5.2 Class observation

The class observation was carried in the February 2007. During the session 6 student groups were present and one tutor who lead the seminar. From the class observation with students we got the impression that most of the students understood what they did wrong when playing the game and what they should do different when playing the game next time. It also became clear that the students wanted to use a certain strategy, but did not use the price strategy according to the one they had set before. Many of the groups tended to choose a lower price without taking into account how the economy acts. It also came to our attention that some students did not reflect over what they have learned in the literature and just 'played for fun'. However, at the seminar the tutor did help to make the students understand what kind of strategy they used and their business decisions effect on the outcome.

We also got the impression that the tutor's assignments and comments in the seminar helped the students understand 'how they played' in the game, and thereby were an important part of the learning element of the use of simulation game. At the seminar some students tried to reason the steps they took in the game and why they got the results they got. They tried to analyze their mistakes and predict what would happen if they would act differently next time. The students that were not able to reason their steps and actions taken were encouraged by the teacher to reflect on them. The teacher asked analytical-type questions to help them understand. The tutor also tried to link the theories learned in the course to the actions students took in the game. We got the impression that most of the students that got a poor result in the simulation game reflected a lot about what they did wrong. Though there were some groups who did not do well and were not able to support their actions with theory as they were just experimenting during the game. Most of the stu-

dents with a poor result replayed the game to see if they could get better result if they acted differently.

When the teacher asked the class what they thought was good about having the simulation game in the course, the overall reply was that the students learned a lot and that it was a fun learning tool. Moreover, one student replied that she did not learn during the game but she learned afterwards when she reflecting about it and when answering the questions from the teacher. However, another student said she did learn during the game when she was analyzing to herself what just happened.

At the same time, another student said that he did not feel that the game was realistic. More students agreed with that statement and felt that they wanted to have more information about the market, affecting factors and information about the past. A student also added that having information on what happened during different season would be preferable. Students also felt that they did not have enough time for playing the game because they only realized after some time what their actions meant for the companies development. In the real life there is possibility to have more historical information as well as the period breakdown in the game could be different (for example monthly, as there are some products that are quite season related and so you can take appropriate actions for particular seasons).

To get a better understanding of the students' experience of the simulation game, we asked them to elaborate on their experiences. The aim was to get to know if the students themselves perceived the simulation game as a good learning tool. Furthermore, students were asked if they believe that they would have learned something if they would just have played it without having teachers asking for reasoning for their activities. The students seem to have reflected over the lecture material; however, one student thought it was hard to use the models from the course and implement them in the game. Another student pointed out one graph used in the simulation game as really good and useful. Further, one more student agreed and stated that she actually used the tools she had learned during the class when playing the game. Together with the tutor the students came to the conclusion that the simulation game actually helped them to understand the link between real life and theories.

5.3 Student questionnaire

From this research with the help of statistical analysis we would like to see the tendency of students' evaluations with respect to simulation games as a learning tool and try to take into account the context within which they have made their conclusions. Therefore, answers from open ended questions and feedback from course evaluations will be used in the analysis to support these opinions. Thus, for reader's convenience we try to give also a good picture on the quantitative data collected from the student questionnaire. Following the table of some of the main results will be presented (see Appendix D for the table of the summary of the entire frequency analysis).

Students agreeing that the simulation game	
Gives a good representation of reality	11.9%
Suits well with the course	50.7%
Improves the course	41.8%
Is an important part of the course	22.4%
Was well introduced in the course	43.4%
Instructions helped me to play the game	44.8%
Is an innovative approach towards study process	65.7%
Students perceiving the game to be somewhat exciting	71.6%
Students perceiving the simulation game to be more effective then lectures and seminars	26.9%
Students agreeing the game improves their other ways of thinking	75%
Students agreeing that the game results well reflected the decisions they made	44%
Students agreeing that the tutor's feedback made them understand their mistakes better	29%
Students thinking that the game is a good test for their skills	70%
Students agreeing that the game increased their knowledge in the subject	58%
Students realizing learning	
When playing the game	50.7%
While doing the assignment	52.5%
Students not using the theories and models from course literature when playing the game and doing the assignment	36 %

Table 2: Summary of the results from the student questionnaire

The respondents of the questionnaire were almost equally distributed over gender, with a slight majority of women (54% were female). While the questionnaire was only distributed to students taking the Marketing Management class at JIBS, all students answered that they were students at different years of JIBS except for 6% that were exchange students. Since there were so few students who have indicated to be international students, entire sample will be taken as one and no difference will be made between international and Swedish students. The answers from the questionnaires indicated that the students did not perceive the simulation game to give a good representation of reality (88.1%); however, around 50% of the students thought that the simulation game suits well with the course. Around 42% of the students agreed that the simulation game improved the course. Still, nearly 78% thought that it was not an important part of the course. To be noticed, only 43.3% of the students believed that the simulation game was well introduced in the course, and 44.8% thought the instructions given help them to play the game. Moreover, the greater part of students agreed that simulation games are an innovative approach towards the study process (65.7%).

The response from the students if they were more motivated for studies because of the game was evenly spread. Around 33% strongly disagreed and disagreed, 30.3% were neutral and 36.4 % strongly agreed and agreed with the statement. We could see that the students did not agree that they put more effort into the game than for other study types. However, also here the results were rather spread with a slight advantage to strongly disagree or disagree with the statement with 43.3%. Moreover, almost 51% of the students agreed that the assignment given with the game did encourage their learning. Further, students were

asked if they believed that simulation game requires a high degree of involvement. Almost 54% agreed or strongly agreed to this statement.

When asked about the excitement level of the simulation game, the students agreed that the game is somewhat exciting (71.6%) However, students' opinions if the simulation game was more exciting than project works and lectures and seminars differed a lot. Only 49.3% considered the simulation game to be more exciting than other types of project work and 52.2% regarded simulation game more exciting than lectures and seminars. When asking the students about their opinion on the effectiveness of the game, nearly 60% agreed that it is effective in some way. Moreover, when comparing the effectiveness of other project works and lectures and seminars the students' opinions on simulation game to be more effective were lower. Around 61% of the students did not believe that simulation game is more effective than other types of project works. Additionally, 73.1% did not agree with simulation game being more effective than lectures and seminars.

Further, 60% of the students agreed with the statement that the decisions the student made in the game were based on intuition. Nevertheless, over 70% of the students did not agree with the statement that the game did not improve their way of thinking at all. A small part of students (31.3%) believed that the simulation game helped to improve their analytical thinking. However, around 61% of the students believed the simulation game to improve their strategic thinking. Over 75% of the students thought that the game improved their other ways of thinking. A large part of the students also agreed that the simulation game is a dynamic way of learning (67.7%).

When answering the question if the game results well reflect the decisions made, a very low percentage of the students were strongly agreeing or disagreeing. Just about 44% agreed with the statement, but a rather large number of students were neutral or disagreeing (around 45%). From the statement if the tutor's feedback made the students understand their mistakes better, the students' answers varied. Close to 39% of the students strongly disagreed or disagreed with the statement with the statement and about 29% agreed or strongly agreed with the statement.

We were interested to see if the simulation game is a good test for any of their skills. Nearly 70% of the students participating did not agree that the simulation game was not a good test for their skills. Around 42% of the students believed that the simulation game was a good test for their decision-making ability as well as for their problem-solving ability. Additionally, nearly 58% of the students participating in the questionnaire agreed or strongly agreed that the simulation game increased their knowledge in the subject. In addition, the majority of students learned when playing the game and doing the assignment (50.7% and 52.5% respectively). Around 85% disagreed with the statement that they did not learn at all. However, only 17.9% stated that they learned when preparing for the game. Around 36% of the students did not use any theories or models when playing the game or doing the assignment. The students seem to use the theories or models a bit more when doing the assignment than when playing the game; however, the usage were rather low (around 39% respectively 30%). The theories and models from other courses where only used by 6% of the students. However, when asking the students if the game made them think of issues that they had not thought of before around 60% gave a positive answer.

Around 45% of the students would prefer playing the game in a more advanced course. Furthermore, when asking if the students just saw playing the game as a fun activity around 42% disagreed or strongly disagreed. However, around 30% were neutral to the statement, but only 4.8% strongly agreed with the statement.

The mean of the hours spent of the game where 9.9 h. The distribution of answers varied from 40 minutes to 50 hours. Further, the mean of the time spent on the assignment was 6.5 h. Here the time varied from 1 hour to 40 hours. When looking at how many times the students played the game the average turned out to be 2.7. Moreover, around 86% of the students believed that the time given to play the game was enough. If the student's expectation of the game compared to the outcome where lower, the same or higher differed a lot amongst our respondents. Nearly 44% of the students state that there expatiations were the same as the outcome. Around 30% seem to have been positively surprised as the expectations were lower than the actual outcome.

When students were asked if they picked the course because of the simulation game and if they would suggest the course to other students because of the use of the game they did not get a positive answer. Around 79% disagree or strongly disagree that they picked the course because of the use of the simulation game. 47% of the students disagrees or strongly disagree with that they will suggest the course to others because of the use of the simulation game. However, around 35% are neutral to the statement if they would suggest the course because of the game or not.

5.3.1 Open-ended questions from the questionnaire

When asked why students played the game more than once, if that was the case, majority of them indicated the reason to get better result as they were not satisfied with their current results. Still, some students admitted that the game was a bit too complicated to grasp all the ideas within one time, thus when playing the first time; they just got acquainted with the game and got familiar with the layout. One of the students even noted that on first time he played through the game in 15 minutes just to see how it really works and second time he played it 'for real'. At the same time some students did it in order to 'learn from '*mistakes"*, test different hypothesis and strategies, and to *"enhance the outcome and simulate what happens with different decisions"*. Some students had pinpointed, that some links within the game were not working as expected (i.e. the cause-effect according to them was not working as it should between some things), thus they played it several times to see the link.

Many students indicated that they would not like to have any other project instead of the simulation game. Some students said that the game was a good way to apply the knowledge they had acquired in the marketing management and it is *"so much more fun and gives you more practical knowledge "*. Furthermore, some students saw the game to be a good complement to other things in the course and according to one student, it *"was well integrated with other activities and was an important part of the course"*. Although for some students the game was more interesting and motivating activity compared to the ordinary assignments, they perceived the learning level to be rather low. One of them suggested that this could be improved by having a more complex and realistic game. Further, there were more students agreeing to this opinion in general and would prefer a different project work that would be more practical and realistic since PharmaSim did not give that clear representation of the real life. Some students suggested having a different game that would have a better layout, some more interesting graphics and structure as well as having game that would be more up do date and more realistic. At the same time other students thought that game was too complicated. They could not see why they got some particular results from their decisions; thus, they would like to have one with less complicated functions behind. Among the students who would like to have another project instead of the simulation game opinions varied like having a reality project, marketing campaign or a bigger exam. One of the students said that anything could be better than simulation game since it was *"incredibly boring, just a bunch of il-*

logically placed numbers and boxes. It really took all the fun out of marketing, and it was obvious that the program was made by someone with no idea whatsoever about how to make a functional program." Another student would have liked to have something as practical as PharmaSim as he prefers to have different parts of the course that include practical and theoretical activities.

Students were also asked to indicate some things that could be improved with the game. Among the most often mentioned suggestions were to improve the interface, layout, graphics, and design as well as make it more colourful, since the game is 15 years old. Further, the game itself could be more up-to-date. Students noted that at the moment it looks rather boring and old; thus, some suggested updating it to the newer software. Additionally, some students proposed making the game more vivid and real since at the moment they do not see that many reality aspects in the game (e.g. putting some pictures, sounds, videos). One of the students suggested involving some real life practice into the game *"like we have to do some real survey or questionnaire to finish the game"*. It was also proposed to make the game flexible and have menus that are changing over periods.

At the same time other students were suggesting to have more explanations on the game by teachers and also throughout the game as well as have more specific instructions on how to play and how the game functions. One student indicated: *"I would have liked more guidance throughout the playing process, more information given to you as you play"*. Another student noted the importance of explanations of certain terms and how could they use them in their marketing. As this was not present, many students just used to *"play the game without knowing exactly what they are doing"*. There were students who noted that information given before each period was sometimes confusing and not clear enough. For some students the feedback was not at the expected level. They would like to have more feedback, on what they did and what could be improved as well as if some consequences occurred because of their decisions or because of their competitor actions.

There was a student thinking that not enough time was spent on the preparation phase and information on what they are supposed to do and achieve; thus, they "*didn't learn that much that they could have*…" They also were not aware on how to reach higher level in the game and believed that it is pure luck and intuition. Moreover, it was suggested to have a better correlation with the course material.

It was suggested by some students not to give game on the floppy disks for the students as well as allow playing it only once. This was of importance since otherwise it was possible *"to reload after every turn, which can make the game very, very easy if you have time"*. Further, some students were looking for more challenge and would like to have results from previous years, so that they would have something to compete with. Additionally, it was proposed that there should be higher grading on the outcome.

There were students referring to the subject of the game (medicine) as not appropriate for their education and distant for economic students. Another student would like to have more stimulation from the game with respect to somebody's creative and analytical way of thinking. The story was indicated to be too narrow. Further, some students noted that the game was too complex *"the marketing course was very basic-but the game demanded far better knowledge of the subject"*. Also some parameters or options could be removed or made more specific, as suggested by students, to make it easier to understand for students. One student said that the importance of some activities should be increased (like purchasing market surveys). With respect to organizational issues, one student suggested making smaller teams; other proposed stressing the importance of the game when giving the grades as well as teacher feedback on games played.

Finally, at the end of the questionnaire there was a possibility for students to add some personal remarks. Some students stressed once more the simulation game as such is good way to learn, but there were some aspects that should be improved like feedback afterwards that could *"follow up why the groups got the results they did; the results should maybe be studied more"*. Some students were unhappy with the course management issues and that simulation game actually dragged down their course grade as well as that game was not realistic enough and assignment was not well explained. Furthermore, it was noted that game was more fun than doing a written project work; still it *"did not promote learning or better knowledge of the subject"*. Some students even faced worse results when they were trying to apply the models from the course literature.

Finally, it was suggested that PharmaSim could be more appropriate in investment courses or stock exchange operations as well as having more simulation games throughout the BBA program as one student believes that it would improve the quality of the education.

5.4 Course evaluation

During the research we had access to the evaluations for the Marketing Management course (at JIBS) filled out by students. From there the students' opinions and reflection about the use of the simulation game PharmaSim.

Many students shared the opinion that PharmaSim was good and appreciated it in the course. One student thought the game "*gave a good representation of more practical issues than the theory*". However one student stated that the game should have been introduced better in the course. For example, a run-through in the class, where the teachers went through how to play and the rules of the game, would have given a better start for the further play. Nevertheless, some students were not happy with the use of PharmaSim. One of them states that the game was too far from the reality with respect to the factors to be considered when making business decisions, only few were available for consideration with PharmaSim. Some students also thought that the design of the game was too boring and lowered the enthusiasm of playing the game.

Still students had left suggestions on what could be improved with the use of PharmaSim. The time given for the game was seen as too short and students suggested allowing more time for playing it. Students also suggested having the simulation game later on in the course after the exam. In that way they believe that they would have more knowledge when playing the game and understand their actions more. One student suggested that the simulation game should not be an assignment but only be used as a learning tool throughout the course. Others believed that the simulation game should be a larger part of the final grade and be graded on a personal level.

6 Analysis

In this chapter we will try to analyze what are the factors behind the difference in the opinions of teachers and students and give some reasoning from their own perspective. Furthermore, critical success factors will be identified to indicate what teachers should keep in mind when introducing a computer-based business simulation in the class.

As one might have noticed from the results' chapter, the opinions expressed by teachers and students with respect to the simulation games are not always the same. From the discussions with the teachers it can be seen that in general teachers perceive the simulation games as good learning tool. However, one should keep in mind that the teachers who are using simulation games were interviewed. Thus, it may not reveal the general opinion of teachers. Still, we think that these teachers are able to give a better evaluation of the simulation games than those who are not using them, since they have practical experience. At the same time, when looking at the opinions expressed by students, not always they were in line with the perceptions of teachers. Student opinions varied over the sample and on average 58% believe simulation games to be a good learning tool as it increased students' knowledge in the subject.

Teachers believed that the simulation game they are using covers all or most parts of the course and saw it as an important part of the course. However, there was not as high agreement to this fact among the students and only 22.4% saw it as important part of the course. For students playing PharmaSim it could be influenced by general dissatisfaction of the game as such. Although more students thought it suited well with the course and improved it, they still were not satisfied with the interface and the design of the game. This finding is also in line with results from the study carried out by Tompson and Tompson (1995) who concluded that simulation games improve the course. Furthermore, although in general students thought simulation game was an innovative approach to the study process, the game itself was not seen as innovative enough. Some students could not see the links between the theories and activities in the game and consequently did not perceive the game to cover all parts of the course as were seen by teachers. Moreover, teachers thought that the game is even wider than the course, which is in line with some of the comments of the students. Some students believed that the game would be more appropriate in other fields.

In order to find why there is a difference between opinions of students and teachers we will explore more in depth the benefits and drawbacks of simulation games identified by teachers. This will be compared with opinions of students and frame of reference. From these benefits and drawbacks the critical success factors for the implementation and the use of simulation games in the courses will be identified.

6.1 Benefits

As one of the benefits teachers considered the simulation games to be beneficial in bringing high student involvement. The majority of students agree with this statement since the mean for degree of involvement was 3.5 (within a scale of 1-5 where strongly disagree is 1 and strongly agree is 5). We would argue that this can lead to the increased learning for students, since they are more involved in the learning process. This was stressed also by Read and Kleiner (1996) who noted that active participation of the student is important in order to succeed in learning process. Additionally, people are more willing to learn if there is reinforcement involved, which could be internal satisfaction that the learner feels after the learning process.

At the same time, when one looks at the time spent for the game, the average is almost 10 hours spent on playing the game and 6.5 hours on the assignment. For the majority of students the time given for the game was enough. Furthermore, some of the teachers stated that they do not perceive the game to take that much time. We also believe that the students will spend approximately the same amount of time on other project works or assignments. However, it should be noticed that there were students that spent up to 50 hours playing the game an 40 hours for the assignment which is rather extreme to our opinion. At the same time, there were minimum extremes such as having spent 1 hour for assignment and 40 minutes for the game. A possible explanation to this could be that these extremes indicate that there are students who are very devoted for the studies and at the same time for some students simulation game was unserious activity.

From the interviews with the teachers another benefit was revealed – students become aware of the need of the theory in practice when they see what issues business struggles with in the market when using simulation games. They also stated that it gives students an ability to see how theories relate to the reality and gives them a practical experience where they can relate to business decisions. Around 64% of the students stated that they did use the theories and models when playing and/or doing the assignment. Still, from the results collected, we would argue that even though simulation game lacks some aspects of the reality, it can help students to see at least partly how the theory can be applied in practice. However, students stated that they lack some real life aspects in the simulation game used. More than 88% of the students thought that the game did not give a realistic view of the reality and it was expressed also by students who were observed in the class. Nevertheless, from the results gathered, one could say that even if the simulation game is not showing entirely all aspects of the market, it is still a good opportunity for students to become aware of the theory in practice. Moreover, some students state that they played the game several times to test the different hypothesis and strategies, and to *"enhance the outcome and simulate what happens with different decisions"* and for some of the students the game was *"so much more fun and gives you more practical knowledge "*. From the discussion above we would like to stress the importance of having a good integration between course materials and game in order to enhance the learning for students; thus, it can be seen as one of the critical success factors.

Moreover, it should be noted that students perceive the assignment to be a very important part of the learning processes as teachers also stated, since the results from the students' questionnaire showed that 52.5% of the students learned when doing the assignment. Thus, it can be concluded that the assignment is important part when learning through the simulation game. The students also stated that when doing the assignment the theories and models were used the most. Moreover, less than 20% of students thought that the assignment did not encourage their learning. This finding indicates that in order to be able to learn through the simulation game as effectively as possible, an appropriate assignment with the simulation game is vital and consequently a critical success factor. Additionally, it is important to have an assignment that is up-to-date and includes some current issues from the market and economy and is practical enough. Some students suggested having a final assignment in the project with simulation game that would require them to do a real market research that would be also related to the game. Thus, the importance of having assignment that asks for more practical and real-life related activities from students should be stressed.

Further, teachers believed that simulation games allow more in-depth learning for what the students are studying. Most of the students (70%) did state that they improve their way of thinking when playing the game. In line with Gilgeous and D'Cruz (1996) who propose

that simulation games can be used to develop completely new skills a rather large part of the students thought that the game helped them to improve their strategic and other ways of thinking. This finding implies that the simulation game can actually be a good learning tool (although students not necessarily recognize it); since it helped the students to form new ways of thinking and reflect over their knowledge. We also support this statement with the fact that over 67% of the students perceived the simulation game as a dynamic way of learning. Teachers also stated that they believed that the simulation game stimulated the students to learn. It seems that there are many indicators from the students supporting this. For example, a lot of students thought simulation game was a fun activity and even those who did not think so, they still learned from it. Therefore, we believe the simulation game could be an indicator for learning even if some students do not perceive the simulation game itself as a very good learning tool. As the ordinary learning methods can be seen as tiresome, another, more stimulating, form of learning exercise might trigger the motivation to learn. However, the importance of having continuous follow up and feedback from the tutor should be noted. As one student stated *"I would have liked more guidance throughout the playing process, more information given to you as you play"*. Others also stated their problems of understanding certain terms and links. Moreover, also in the class observation it was clear that some explanation and feedback from the tutor helped students to understand why their results were as they were and encouraged them to analyze more their activities. Additionally, referring to the statement made by Funke (1998) that it depends not only on the learner but also on activities of the teacher to what extent students are able to achieve the learning goals, on can stress the importance of having a communication between student sand teachers. Therefore, the tutors guidance and follow up is also seen as one of the key issues and will be added as a critical success factor.

As discussed before, learning with ordinary learning tools might be somewhat tedious, thus simulation games can be a nice interference that might motivate students. Teachers also discuss the challenging part of the game as a motivator for students to perform well. When playing the game it is not only the challenge to get a good grade that is important, but also to perform better than your fellow students. As stated earlier in the thesis, the fact that simulation games make students more motivated is supported by a number of researchers e.g. Jones (1980), Fripp (1997), Frauenheim (2006) and Tompson and Tompson (1995). Tompson and Tompson (1995) also derived a conclusion that simulation game also increases the interest, motivation, effort and learning of students when it is applied for the course.

The result in the game might also be seen as another grade for the students then the final grade of the course. Large number of students also indicated that it was because of the challenge they played the game numerous times in order to get a better result. From the student questionnaire it is shown that the mean time of playing the game is 2.7 times. Some students stated they first played through the game fast to be able to understand the game better. Further, as stated above, there were students playing the game several times to see if they can perform better. This finding stresses the game to be a good tool when considering the learning aspect, since students use different theories and models to see if they can improve their results with different strategies. However, there were students who played it substantially more times just to get higher scores by trial and error, without any theories and models in mind. At that point it seems that the learning in no longer through theories, but more as learning by doing. Therefore, we would like to point out that it is crucial to decide upon the right number of times to play the game in order to achieve the highest possible learning from playing. Thereby choosing the right number of times to play the game is added as a critical success factors.

Teachers stated that the simulation game gives the students a taste of how each of the subjects are applied in the real life and what they are really about and that they learn the language of business, which is something that we agree upon. Some students state that the theories they have learned became much clearer and they really understood why the theories are formed the way they are formed. It is easy to just memorize some stages of a model, but if there is something that can be interconnected to this, and then it is much easier to learn and understand. However, we would like to stress once again that for the students to really learn what business is actually about, the tutor's feedback and follow up is vital. Some students stated that they had problems understanding all concepts and expressions that were not defined. As mentioned earlier in the thesis Funke (1998) states that it might be seen as a drawback that links between different variables within the game might be hard to understand. Also Gilgeous and D'Cruz (1996) had noted that many users actually are not aware of the full scope of the game. When playing simulation game it is easier to work around the question instead of looking the answer to the question while some decisions can be based on intuition. We also agree with the teachers when they state that simulation games help students to form an understanding for the interplay of different factors within the subject. However, this understanding might not be as noticeable for the students themselves, but more arrive as a surprising revelation. It should be noted that some students complained of having problems with seeing the links between the different factors when playing and would like to have a closer contact with the tutor during the play. Thus, we see that continuous support from the teachers is critical for achieving higher learning from the simulation game.

6.2 Drawbacks

As one of the drawbacks teachers in the interviews mentioned that in fact for students the competition aspect becomes more interesting than the learning. Also some students mentioned that it would be more interesting to have results from previous year, so they could have something to compete against. Although this can be partly seen as a drawback, we would still argue that competition aspect does not eliminate learning aspect. Instead, by having higher demands on students' results and trying to be more competitive, may encourage them to actually learn more. For example, they may search more in the literature on how to be more compatible in particular cases as well as try out several strategies (if that is allowed) and learn what are the aspects in each case that influence their success. In this case it could be more focused on the learning by doing. This kind of learning is in line with Shepard's (2000) argument that a person learns and becomes an 'expert' when he/she thinks and represents proplems in a coherent way instead of just gathering information. Additionaly, this possibility of active participation is one of the advantages of simulation games that Gilgeous and D'Cruz (1996) mention.

As mentioned during literature research, sometimes simulation games are referred as taking up a lot of time and resources. Still, teachers could not fully agree to this and saw this time and effort usefully put into work even though it could be more than time that is required by other learning tools. When it was compared to the data gathered from the students, it seems that actually project works with simulation game does not take that much time, at least in this case. As mentioned before, the time spent on playing the game and writing the assignment was on average at the same level that would have been spent on other type of project. One could argue if it is worth with respect to lectures and seminars, but here the practical part of the simulation games should be kept in mind. Additionally, some students believed that simulation games are more effective than lectures and seminars as well as

other types of project works, thus it implies, that games can be seen also as an effective tool. This is in line with findings of Martin and McEvoy (2003) who concluded that simulation games are more effective than lectures and case studies as well as it is good tool for critical and analytical thinking. Although Gilgeous and D'Cruz (1996) were confident in saying that simulation games are more effective than other learning tools, Tonks and Arbitage (1997) could not certainly agree to that, since it depends from the environment and cultural setting of the learning process. Also this thesis can not give 100% proof that the simulation game is more effective than other learning tools, there were some more obstacles that negatively influenced the student evaluations (like layout and interface of the game). Nevertheless, there is certain amount of students who still believe in it; therefore, we would conclude that simulation game is effective tool for learning. Even more students thought that games are more exciting and as long as the excitement level is higher for some activity, it is possible to obtain also higher interest from students.

One may suggest from the results that simulation games do not fit everyone, as was noted also by teachers during the interviews. It can be also seen from the student data that their opinions vary a lot. The same factors for some people were positive whereas at the same time for other student they were disturbing (e.g. allow playing game more than once, complexity of the game). As was noted by one of the teachers, that simulation games may help students who are already motivated for studies. As mentioned earlier in the thesis, Romme (2003) proposed that motivation actually leads towards much deeper and more integrated understanding of students. At the same time student who is not taking studies seriously, will not take the game seriously either and will not be able to see the learning objective behind it, since *"learning is responsibility of each of us"* (interview with one of the teachers). However, as proposed by one of the teachers, the game can help stimulate the student that is 'on the line' – he/she has rather neutral and indifferent attitude towards studies and my having a learning tool that is more exciting than original ones, this student might be motivated more for the studies. This can be explained also by having more than one third of students admitting that they had a higher motivation for studies because of the game, half of the sample actually put more effort in the game if compared with other study types and for more than 60% the assignment given together with the game encouraged their learning. Additionally, teachers mentioned that some students might have unserious attitude because it is just game and perceive it just as fun. When students were asked on this issue, majority of them were actually negative or neutrally positioned towards this statement and only 26% could agree to it. Moreover, when asked if they learned at some of the stages when playing or preparing for the game, or doing the assignment, there were only approximately 15% of students who noted that they did not learn anything. The rest of the students learned at least in one of the stages. Thus, we would like to suggest, that simulation games will not be a good tool for every student, but still it is definitely a good tool with respect to increasing student motivation towards learning. Having a game that is interesting and encourages students to learn can, therefore, be seen as one of the critical success factors.

It was argued that some aspects of the reality are not well represented in several games that were examined. Also students brought up that simulation game they were using, did not give a good representation of the reality and suggested to have more up-to-date software and game that has more exciting interface. As it was noted by Duffy and Jonassen (1992), learning must be situated in the rich context and it is important to have a reflection on the real-world. We also believe that having a modern game is rather important since everything around us is developing on a continuous basis students want to see the modern things also in their learning environment. Still one of the teachers who checked on several games said that he still chose the one with not that interesting layout, but it suited better the course,

which he saw to be as an important factor. Students with respect to this game were rather negative regarding that game was old fashioned.

We would opine that having an attractive layout is important factor for students, to find the learning more interesting. It is quite often so that the small things build the environment around us and influence the way people act and feel, thus by having just visually more attractive game could lead to higher excitement and motivation to learn from the students, which at the end would result in a higher learning and knowledge acquisition level. Nevertheless, one should not neglect the fact that game has to be appropriate for the course; otherwise the value added will be rather small with respect to particular subject. Moreover, some games not always explain students how to handle some issues, as noted by one of the teachers was example of bankruptcy. To our mind this is closely linked to the reality aspects of simulation games, meaning that they are very limited.

Thus, additionally or even instead of choosing more modern and up-to-date game teachers can help to solve the reality issue by bringing in some of these aspects in the assignment (as was noted already by one of the teachers who is trying to put in some current issues from the market into the assignment). One of the students suggested, that actually simulation game could be complemented with a final question in the assignment which asks students to go out in the real life and carry out some research based on the simulation game. This could definitely help teachers to update their way of applying game in the course and make it more interesting for students as well as if the assignment includes some issues from the problems occurring in the real life at the moment, it makes the game and assignment more connected to the reality. Moreover, it takes a lot of time for the teacher to develop and structure the course. Thus, it would not be convenient neither for teacher, nor student to have the game changed every time a something better comes into the market since there is a learning time also for teachers to get acquainted with the game and how to better present it for students. Instead, if there is the same game used as a basis in the course for several years, then by having an assignment that includes some more up-to-date issues from the real life allows finding a middle way between sticking to the same game for many years and having a new game every other year. From this following critical success factors can be derived: having an up-to-date simulation game and choosing the proper way of introducing the game in the course.

Once more we would like to note that a rather important part of successful use of simulation games is having appropriate tutoring and feedback when simulation game is used in the course. Among the drawbacks mentioned by teachers was that without tutoring there is a high possibility to misunderstand the cause and effect. Of course, teachers are more knowledgeable than students on the subject that they are teaching and they are also more aware of the simulation game and how it works. Thus, they are able to better explain some actions and responses, and effects from the game. The knowledge of the students could be limited within the topic while they are still learning; thus, the role of the teacher is to help them to understand and learn. What is rather striking factor, teachers are aware of the importance of feedback and need for follow-up in several stages while the game is played; still, results from the questionnaires with students shows that students would like to have more feedback and were not satisfied with its level currently as the score showing to what extent teacher's feedback helped students to understand their mistakes is below the average (2.71). Also among the suggestions on what could be improved with the game students played, several of them pointed out having more feedback from the teacher would be better. Furthermore, they would like to have more participation from teachers when the game is introduced in the course; meaning more explanations and suggestions. This stresses the

importance of having proper introduction and instruction for the game. Also the data from the questionnaire indicates that for almost 45% students the instructions helped to play the game and only 44% were satisfied with the way their game was introduced in the game.

Gilgeous and D'Cruz (1996) do suggest that game should not be used alone in the course. It should be combined with the traditional teaching method. This is in line with expectations and demands of students from this sample who would like to have more seminars with respect to the simulation game where it could be better introduced and explained to them. Thus, it means that there is still a lot of room for improvement on how the game can be introduced in the course with respect to PharmaSim simulation game. Also with respect to other simulation games the same aspects can be applied since by having appropriate introduction of the game by teachers, the basics can be set up correctly in order to support the further learning of students in the course. Since, if the basics will not be right for students, all the further learning process may go wrong direction and not give the expected results. These points once more stresses the importance of choosing the right way of introducing the game into the course as well ass having continuous support and clear feedback from the tutor as well as have a good link with other learning tools in the course in order to get the most benefits out of the using the game in the course.

As the final drawback it was mentioned that students actually are rather risk-aware when playing the game. Teachers would like to see them taking more risky strategies since it is a simulation game and they have possibility to try out strategies in a safe environment that one would never try in the real life. This is also stated by Fripp (1997) where he claims that simulations offer a *risk-free environment* where the participants can try out there actions. To be able to support students in taking more risks, it can be suggested for teachers to communicate this to students better in the beginning. This links together with previously mentioned factor on having a proper introduction for the game in the course. Nevertheless, we would like to question if it is actually the case that students do not try some crazy strategies. Although it was not noted in the student questionnaire, but there might be a case when students on their own take a game and try out some so called 'crazy' strategy, which is not reported to the teacher afterwards. Instead, some students mentioned that they played a game in the beginning for the first time very quickly to see how it works and then played it for real. We would believe that those first time 'quickly' played strategies were something more risky than the ones students used when they were carefully analyzing every step.

Finally, we would like to refer the reader back to the literature framework, where Walters et al. (1997) discussed the issues that arise within the group relationships may influence the result of the group performance. However, nothing like this was brought up by students, thus it can be concluded that this was either kept within the group or students did not see the group atmosphere so important in influencing their learning from playing the game.

6.3 Critical success factors identified

Following, the list of the identified critical success factors (CSFs) is presented in the importance of our opinion:

1. *High integration between the course material and the game;*
2. *Choosing a proper way to introduce the game in the course;*
3. *The importance of having an appropriate assignment to get the highest learning outcome from the use of the game;*
4. *Continuous support, clear feedback and follow up by tutor;*

5. *Through assignment make a higher link with the real life and have assignment that encourage more practical activities in the real life carried out by students;*
6. *Choosing the right number of times to play the game;*
7. *Have supportive learning tools, not just the game alone in the course;*
8. *Having an modern and up to date game that is interesting and encourages student learning.*

7 Conclusion

This section of the thesis is aimed at summarizing the main ideas and findings of the study.

From this research it can be concluded that the simulation games already can be seen as a good learning tool, since only 24% of the students thought that the game they played did not increase their knowledge. However, there are number of factors that need to be fulfilled in order to get the highest outcome with respect to the learning. It was surprising that only 7.5% of the students strongly agreed with the statement that the simulation game increased their knowledge. However, from the questionnaire, class observation and interviews with the teachers, it was possible to find the reasons for it. There were several factors that were not carried out in the best way and as a consequence affected their experience.

First of all teachers should make sure, that there is high integration between the course material and game that is used. Furthermore, this link has to be made clear also for the students, so they would actually put in practice the theories and models they are learning in the course in the most appropriate way. With every learning tool, it has to be properly introduced in the course, by developing proper assignment, choosing the right number of times to play the game and deciding upon the way, how student should reflect on their experience. Up till now only 43.4% of the students were satisfied with the way the game was introduced in the course. This means that there is still room for improvement and above mentioned aspects that can influence the student satisfaction were summarized from opinions expressed by students.

Additionally, although simulation games are seen in general as a good representation of the reality, not always this is accepted by students. In this case it was only 12% students who could say that the simulation game that they were playing gave a good representation of the reality, which to our opinion is very low percentage and should be definitely increased. Since teachers are not the ones to change the game and how it is developed, one can go around this issue by developing appropriate assignment. Moreover, it is not enough with just giving the game and assignment for the students. The same way teachers are asking for students to reflect on their experience with the game, teachers should reflect on the experience students had had and help them to understand some of the cause-effect relation that they might not see themselves. At the moment there were number of students who thought that feedback was not good enough; thus it leads to a limited learning capacity for them. Consequently, it is important, that teacher provides continuous support and follow up for the students, thus encouraging more analytical thinking throughout the whole process of playing simulation game.

Moreover, we see it to be crucial, that game links well together with other learning tools used in the course, so that the best proportion with practical and theoretical learning is applied. Finally, as students are always more open to innovative things, the game itself should have up-to-date issues included.

We would like to point out for the reader that the empirical data of this study to a large extent was in line with the previous studies, as one may have noted from the analysis. We also believe that, if teachers will follow the critical success factors stated on page 48, when implementing the simulation game to the course, the learning experience will be more successful for the students.

8 Reflection

The following chapter presents the implication and contribution the study has. Furthermore, we will reflect on the whole study and indicate the limitations this thesis has at the moment and give some suggestions for the further research.

8.1 Implications and contributions

We see that this thesis can be useful for two major groups. First of all, from this research it can be seen that the teachers are not always successful in introducing and running a simulation game in the course. Therefore, we believe that this study could help them in this process by carefully considering the identified CSFs. Teachers can become more aware of student expectations and learn from the experience of other teachers and improve the way they are conducting the course.

Secondly, we see this study as a contribution to the field of academic research. It can serve as a basis for other researchers or as a reference guide within the computer-based learning environment.

8.2 Limitations and future research suggestions

We are aware of fact that this study has several limitations. Due to the limited resources, only students from one university filled in the questionnaire. Thus, it might not give a good representation of the whole student population and may not give as high generalizability as one might expect. Still, we believe that it does allow getting an insight in opinions possessed by students with respect to the simulation games. Moreover, it can serve as a starting point for another study, which would cover larger population and students from several universities.

Furthermore, some of the interviews were carried out through emails which limited our ability to go much into depth in every particular situation. Nevertheless we tried to formulate the questions so that they would cover the topic as well as possible. Moreover, email interview allowed contacting a geographical dispersed sample.

Taking into account that this study is of qualitative nature with some additions of quantitative analysis with a phenomological approach is used, the results might to a large extent be context dependent and case specific. However, we believe that this allowed gathering more specific results, which helped to better determine the critical success factors through the analysis. Finally this study does not explore the opinions of teachers who do not use computer-based simulation games in their courses. One should know that this was one of the delimitation that was given in the beginning of this thesis, but we would like to purpose this as one of the leads for future studies.

To conclude, we would like to suggest testing the critical success factors identified in this study within a larger population of qualitative nature.

References

British Council (2007). *Business Game.* Retrieved 2007-05-11 from: http://www.britishcouncil.org/taiwan-academic-science-educational-activities-business-game.htm

Cottam, M., & Preston, T. (1997). Introduction to the Special Issue: An Overview of the Value and Use of Simulations in the Academic, Business and Policy Communities. *Journal of Contingencies and Crisis Management 5* (4), 195-197.

Dovey, J., & Kennedy, H.W. (2006). *Game Cultures: Computer Games as New Media.* NY: Open University Press.

Duffy, T. M & Jonassen, D. H. (1992). *Constructivism and the Technology of Instruction: A Conversation.* Lawrence Erlbaum Associates. New Jersey.

Frauenheim, Ed. (2006, April 10). Can Video Games Win Points as Teaching Tools? *Workforce Management 85* (7), 12-14.

Fripp, J. (1997). A Future for Business Simulations? *Journal of European Industrial Training, 21* (4), 138-142.

Funke, J. (1998). Computer-based Testing and Training with Scenarios from Complex Problem-solving Research: Advantages and Disadvantages. *International Journal of Selection and Assessment 6* (2), 90-96.

Game Downloads (2007). *Marco* Polo. Retrieved 2007-05-10 from: http://free-game-downloads.mosw.com/abandonware/pc/simulations/games_i_o/marco_polo.html

Gilgeous, V., & D'Cruz, M. (1996). A Study of Business Management Games. *Management Development Review 9*(1), 32-39.

Gomm, R. (2004). *Social Research Methodology: a critical introduction.* Palgrave Macmillan. New York.

Hardy, M & Bryman, A. (2004) Introduction: Common threats among Techniques of Data Analysis. In M. Hardy, & A. Bryman (Eds.), *Handbook of data analysis*, (p.1-15), London: SAGE Publications Ltd.

Heil, A.H. (1992). Multimedia systems as teaching-systems. In H. Klandt, & D. Müller-Böling (Eds.), *Internationalizing Entrepreneurship Education and Training: Proceedings of the IntEnt92 Conference Dortmund, June 23-26, 1992* (p. 215-221). Köln-Dortmund: Förderkeis Gründungs-Forschung.

Interpretive Simulations (2007). *PharmaSim, Marketing Management Simulation.* Retrieved 2007-05-11 from: http://www.interpretive.com/pharmasim/index.php?content=ZYWoLM+gaIH/RAWdZqZWa2N9RceiRKCIUPFfVZS8wyQ=

Iowa State University College of Business (2007). *PharmaSim.* Retrieved 2007-04-14 from: http://www.bus.iastate.edu/kpalan/mkt443/pharmasi.htm

Jackson, M. (Mar, 2004). Making Visible: Using Simulation and Game Environments Across Disciplines. *On the Horizon, 12*(1), 22-25.

Jayakatnhan, R. (2002). Application of computer games in the field of education. *The electronic library 20* (2), 98-102.

Johnson, B., & Turner, L.A. (2003). Data collection strategies in mixed methods research. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of Mixed Methods in Social & Behavioural Research* (p. 297- 319). London: SAGE Publications.

Jones, K. (1980). Simulations – Reading for Action. *Literacy 14* (3), 12-24.

Kendall, K., & Harrington, R. (2003). Strategic management education incorporating written or simulation cases: an empirical test. *Journal of Hospitality & Tourism Research 27* (2), 143-165.

Lainema, T., & Makkonen, P. (2003) Applying constructivist approach to educational business games: Case REALGAME. *Simulation & Gaming, 34* (1), March 2003, 131-149.

Martin, D., & McEvoy, B. (2003). Business Simulations: a Balanced Approach to Tourism Education. *International Journal of Contemporary Hospitality 15* (6), 336-339.

Marton, F & Booth, S. (2000). *Om lärande*. Studentlitteratur. Lund.

Michael, D.R. (2005). *Serious Games: Games that Educate, Train and Inform*. Course Technology, Inc. Retrieved on 20-02-2007 from: http://site.ebrary.com.bibl.proxy.hj.se/lib/jonhh/Top?channelName=jonhh&cpage=1&f00=text&frm=smp.x&hitsPerPage=10&id=10087000&layout=document&p00=simulation+games&sch=sch&sch.x=0&sch.y=0&sortBy=score&sortOrder=desc

MobyGames (2007). *Marco Polo*. Retrieved 2007-04-16 from: http://www.mobygames.com/game/dos/marco-polo

Moran, D (1999). *Introduction to Phenomenology*. Florence, KY, USA: Routledge, retrieved 2007-06-21 from: http://site.ebrary.com.bibl.proxy.hj.se/lib/jonhh/Doc?id=10035294&ppg=25

Morgan, G., & Smircich, L. (1980). The Case for Qualitative Research. In P. Johnson, & M. Clark (Eds.), *Business and Management Research Methodologies* (p. 78-89). London: SAGE Publications.

Naish, R. (December 2006/January 2007). Entertain Me... Recruit Me: How games are beginning to imitate working life. *E-learning Age*, pp 8-9.

Newell, S., Robertson, M., Scarbrough, H. & Swan, J., (2002) *Managing Knowledge Work*, Palgrave Macmillan, Hampshire

Nordqvist, M. (2007). *Lecture Qualitative Research*: *From Problem to Product - Crafting a Qualitative Research Study*. Retrieved 2007-05-10 from Jönköping International Business School website:

http://jibsnet.hj.se/documents/index.asp?SID=11&GID=kurs_RESMET&PID=8635511852833810520

Read, C.W, & Kleiner, B.H. (1996). Which Training Methods are Effective? *Management Development Review, 9* (2), 24-29.

Riley, R., Wood, R. C., Clark, M. A., Wilkie, E., & Szivas, E. (2000). *Researching and Writing Dissertations in Business and Management*, London; Thomson Learning

Romme, A.G.L. (2003). Learning Outcomes of Micro worlds for Management Education. *Management Learning 34* (1), 51-61.

Rudell, B. R & Unrau, J.U. (2006).*Theoretical Models and Processes of Reading.* International Reading Association. Newark.

Rutter, J., & Bryce, J. (Eds.). (2006). *Understanding Digital Games.* London: SAGE Publications Ltd.

Sanders. P, (1982) Phenomenology: A New Way of Viewing Organizational Research. *Academy of Management Review*, Vol. 7, No. 3. 353-360.

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students* (4th ed.). England: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2003). *Research Methods for Business Students* (3rd ed.). Harlow: Pearson Education Limited.

Samuelsson, S. (2006). *IT- baserade affärsspel för erfarenhetsbaserat lärande. Systemstruktur och möjliggörande*. 2006:03. Luleå tekniska universitet.

Solomon, M. (2002, July 29). Fun & Games – and business insight. *Computerworld 36* (31), pp 36 – 37.

Stockholm School of Economics (2007). *Företagsspelet Minimax* . Retrieved 2007-04-14 from: https://studentweb.hhs.se/CourseWeb/CourseWebPublic/CWPublic.ASP?WCI=StaticHTML&WCE=minimax&CourseNr=301&Period=0704

Stratx Simulations (2007). *Markstrat Online*. Retrieved 2007-04-14 from: http://www.stratxsimulations.com/what_it_covers.htm

Teddlie, C. & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioural sciences. In A. Tashakkori, & C. Teddlie (Eds.), *Handbook of Mixed Methods in Social & Behavioural Research* (p. 3- 50). London: SAGE Publications.

Teubner, R. A. (1992). Computer based methods in entrepreneurship education: An overview. In H. Klandt, & D. Müller-Böling (Eds.), *Internationalizing Entrepreneurship Education and Training: Proceedings of the IntEnt92 Conference Dortmund, June 23-26, 1992* (p. 201-205). Köln-Dortmund: Förderkeis Gründungs-Forschung.

Tompson, G.H., & Tompson, H.B. (1995). Using Simulations for Group Projects in Business School Education. *Journal of Education for Business 71* (2), 97-102.

Tonks, D., & Arbitage. S., (1997). A Framework for Understanding Learning From Management Simulations*, Journal of Computer Assisted Learning* 13, 48-58.

Walters, B.A., Coalter, T.M., & Rasheed, A.M.A. (January/February 1997). Simulation Games in Business Policy Courses: Is There Value for Students? *Journal of Education for Business 72* (3), 170-174

Webpolo. (2007).*Webpolo; Demo & Manual.* Retrieved 2007-04-14 from: http://www.fek.su.se/home/bic/mp/demo/1.htm

Zhang, Z.G. (2000). Simulation. In M. Zeleny. *IEBM handbook of information technology in business* (p. 432-440). London: International Thomson Business.

Zimulus (2007). *Zimulus Enterprise Game.* Retrieved 2007-04-14 from: http://www.zimulus.se/465.php

Appendix A: Interview questions for the teachers

Overall questions:

1. How long have you been teaching in your university?
2. Which is the subject you have been using the simulation game for?
3. How long you have been teaching this course?
4. For how long time you have been using the game in this course?

Question about the game:

5. What is the name of the simulation game you are using? (Is it meant for group or individual playing?)
6. How did you decide to introduce the simulation game in the course? Was it your own decision?
7. How much have you worked with this game before introducing it in the course? What were the main actions you took? At the moment, are you well educated on the game and know exactly how you need to act to be successful? Is there one or various ways how to succeed?
8. Do you have an assignment for students to do when playing the game or you just give them the game and tell to play it? If you use an assignment, how it is designed and what are the main objectives of the assignment?
9. Have you got examples from the game developer of what kind of questions you should ask in the assignment and so on or did you only buy the game itself with no guidelines?
10. To your opinion, does game complements well with the theory and course literature? Do you see it as additional tool for learning the same things but much more practically and maybe also in depth or the simulation game brings up entirely new issues for students?
11. Does simulation game cover all parts of the course or just some?
12. Do you feel that this simulation games is important for this course? Why?
13. To your opinion, what are the benefits and drawbacks of the game (give 2 or 3 for each, if possible)?
14. Using simulation games takes up a lot of time from other possible learning methods for the student (like reading book). To your opinion, is it worth it?
15. Have you seen any improvements from students (if you can compare it with the time when there was no simulation game)?
16. Have you tried several methods how to present the game to students in order to get higher involvement from the students? If yes, have you seen any differences and which was the most effective way?

17. Have you changed the use of the game a lot in the past (the game itself – switch to another game; requirements for students – assignment)? If there have been any changes, what kind of? If not – why not?

18. Do you think this simulation game could be of use in some other area, or some other course in the same subject that is not currently using it?

Opinion about other games:

19. Do you feel that simulation games in general are value added for the study process?

20. To your opinion, are simulation games appropriate at any age level, or is there some specific time and occasion when one should use it?

21. Do you think simulation games are useful if they are used outside classroom (outside the context of the course)?

Appendix B: Questionnaire for students

1. Gender:

2. Please indicate the university and year you are studying in:

3. The simulation game (check all that apply):

- ☐ gives a good representation of reality (3a)
- ☐ suits well with the course (3b)
- ☐ improves the course (3c)
- ☐ is an important part of the course (3d)
- ☐ was well introduced in the course (3e)
- ☐ instructions helped me to play the game (3f)
- ☐ is an innovative approach towards study process (3g)

4. I was more motivated for studies because of the game (3h)

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

5. I put more effort into the game than for other study types

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

6. Assignment given with the game encouraged my learning

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

7. Simulation game requires high degree of involvement

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

8. The game is more exciting than (check all that apply):

- ☐ other types of project works
- ☐ lectures and seminars
- ☐ nothing, it's not exciting at all

9. The game is more effective than (check all that apply):

- ☐ other types of project works
- ☐ lectures and seminars
- ☐ nothing, it's not effective at all

10. The decisions I made in the game, were based on intuition

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

11. The game improved (check all that apply):

- ☐ my analytical thinking
- ☐ my strategic thinking
- ☐ my other ways of thinking
- ☐ no, it didn't improve my way of thinking at all

12.I see the game to be a dynamic way of learning

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

13. I think game results well reflected the decisions I made

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

14. My tutor's feedback made me understand my mistakes better

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

15. This game is a good test for (check all that apply):

- ☐ my decision-making ability
- ☐ my problem-solving ability
- ☐ my other skills
- ☐ no, it's not a good test for my skills

16. I believe the game increased my knowledge in the subject

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

17. I learned (check all that apply):

- ☐ when preparing for the game
- ☐ while playing the game
- ☐ while doing the assignment
- ☐ nothing

18. I used theories and models (check all that apply):

- ☐ from course literature when playing
- ☐ from course literature when doing the assignment
- ☐ from other courses
- ☐ I didn't use any theories or models

19. I would prefer playing the game in a more advanced course

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

20. The game made me think of issues that I had not thought of

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

21. Game was just fun activity for me

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

22. How much time (hours) did you spend on the game?

23. How much time (hours) did you spend on the assignment?

24. How many times did you play the game?

- ○ Once
- ○ Twice
- ○ 3-4
- ○ 5 or more

25. If you played it more than once, what was the reason for it?

26. Time given for playing the game was:

- ○ too little
- ○ enough
- ○ too long

27. My expectations about the game compared to the outcome were:

- ○ lower
- ○ the same
- ○ higher

28. Would you prefer to have another project instead of game?

29. Can you list 3 things that could be improved with the game?

30. I picked the course because of the use of sim. game

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

31. I would suggest this course because of the use of the game

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral
- ○ Agree
- ○ Strongly agree
- ○ No opinion

32. Is there something you would like to add?

Appendix C: Questions asked after the class observation

1. Did you learn anything and do you see simulation game as a good learning tool and value adding?
2. You think, you would have learned something if you would just play it without having teachers asking for reasoning for your activities? (Would you have learned something if you wouldn't have the assignment from the teachers)?
3. Do you think it was important to have the tools with you that you learned earlier in the course (from books and so on)? Would you have acted differently if you played the game before taking this course?

Appendix D: Results from frequency analysis

Question	Mean	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Yes (%)
1) Gender							
Male							46.3
Female							53.7
2) University							
JIBS							93.9
JIBS exchange							6.1
3) The simulation game							
Gives a good representation of reality							11.9
Suits well with the course							50.7
Improves the course							41.8
Is an important part of the course							22.4
Was well introduced in the course							43.4
Instructions helped me to play the game							44.8
Is an innovative approach towards study process							65.7
4) I was more motivated for studies because of the game	2.98	13.6	19.7	30.3	27.3	9.1	
5) I put more effort into the game than for other study types	2.78	13.4	29.9	26.9	25.4	4.5	
6) Assignment given with the game encouraged my learning	3.31	9	10.4	29.9	41.8	9	
7) Simulation game requires high degree of involvement	3.52	6.1	16.7	13.6	47	16.7	
8) The game is more exciting than							
Other types of project works							49.3
Lectures and seminars							52.2
Nothing, it's not exciting at all							28.4
9) The game is more effective than							
Other types of project works							38.8
Lectures and seminars							26.9
Nothing, it's not effective at all							40.3
10) The decisions I made in the game were based on intuition	3.54	3.1	16.9	20	43.1	16.9	
11) The game improves							
My analytical thinking							31.3
My strategic thinking							61.2
My other ways of thinking							23.9
No, it didn't improve my way of thinking at all							29.9
12) I see the game as dynamic way of learning	3.6	4.6	7.7	20	58.5	9.2	
13) I think game results well reflected the decisions I made	3.21	6.1	19.7	25.8	43.9	4.5	
14) My tutor's feedback made me understand my mistakes better	2.71	19	25.4	27	22.2	6.3	

Appendix D: Results from frequency analysis

Question	Mean	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Yes (%)
15) The game is a good test for							
My decision-making ability							41.8
My problem-solving ability							41.8
My other skills							17.9
No, it's not a good test for my skills							31.3
16) I believe the game increased my knowledge in the subject	3.33	7.5	16.4	19.4	49.3	7.5	
17) I learned							
When preparing for the game							17.9
When playing the game							50.7
While doing the assignment							52.2
Nothing							14.9
18) I used theories and models							
From course literature when playing							29.9
From course literature when doing the assignment							38.8
From other courses							6
I didn't use any theories or models							35.8
19) I would prefer playing the game in a more advanced course	3.25	7.8	20.3	26.6	29.7	15.6	
20) The game made me think of issues that I hadn't thought of	3.45	9	13.4	17.9	43.3	16.4	
21) Game was just a fun activity for me	2.78	11.1	31.7	30.2	22.2	4.8	
22) How much time (hours) did you spend on the game?	9.87						
23) How much time (hours) did you spend on the assignment?	6.5						
24) How many times did you play the game?							
26) Time given for playing the game was							
27) My expectations about the game compared to the outcome were							
30) I picked the course because of the use of simulation game	1.48	63.8	25.9	8.6	1.7		
31) I would suggest this course because of the use of the game	2.43	26.2	21.5	35.4	16.9		