Users’ perceptions toward interaction equivalency theorem in distance education

Master’s (one year) thesis in Informatics (15 credits)

Zahra Salamati

2012MAGI07
Title: Designing Interaction Equivalency in Distance Education

Year: 2012

Author/s: Zahra Salamati

Supervisor: Bertil Lind

Abstract

The fundamental advancement of information technology has given rise to distance education industry hence it has helped to the popularity of distance education among people. However, for employing innovative and advanced tools universities need financial resources. Reaching to these resources is not easy and accessible. Interaction equivalency theorem can be a good solution for overcoming the financial problems but designers are reluctant to utilize it because they think that education quality will decrease due to lack of teacher interaction. This study demonstrated that students’ perception toward interaction equivalency is positive as long as they have high level of interdependency with other students. Without this level of, students are not motivated in order to continue their courses. This study by providing technopedagogical design and IS design theory for support of IE helps e-learning practitioners who want to design an acceptable distance educational system with limited financial resources.

Keywords: situated learning theory, Interaction Equivalency, students’ perception, student-teacher interaction, student-student interaction, student-content interaction, social interdependency theory, positive interdependence, cost-effective design, e-learning, IS design theory,
Acknowledgements

Throughout the construction of this thesis, I have received support from several individuals. First, I want to thank the School of Business and Informatics at Boras University. I would like to express my sincere thanks to my supervisor Bertil Lind, for providing valuable advice and suggestion throughout the thesis work and also Anders Hjalmarsson for his help and patience. I would like to thank my family especially my husband for great support and encouragement.
# Table of Contents

1  **INTRODUCTION** ................................................................................................................................. 2  
   1.1  **BACKGROUND** ............................................................................................................................. 2  
   1.2  **STATEMENT OF PROBLEM** ......................................................................................................... 3  
   1.3  **PURPOSE OF STUDY** ...................................................................................................................... 4  
   1.4  **RESEARCH QUESTIONS** ................................................................................................................ 4  

2  **RESEARCH DESIGN** ............................................................................................................................. 5  
   2.1  **RESEARCH PERSPECTIVE** ............................................................................................................ 5  
   2.2  **RESEARCH STRATEGY** .................................................................................................................. 6  
   2.3  **DATA COLLECTION PROCEDURES** ............................................................................................. 7  
   2.4  **DATA ANALYSIS PROCEDURES** ................................................................................................. 8  
   2.5  **STRATEGIES FOR EVALUATING FINDINGS** ............................................................................... 9  
   2.6  **RESULTS PRESENTATION METHOD** ............................................................................................. 9  

3  **THEORETICAL STUDY** ....................................................................................................................... 10  
   3.1  **KEY CONCEPTS** ............................................................................................................................ 10  
   3.2  **RELEVANT SUBJECT AREAS** ...................................................................................................... 10  
   3.3  **PREVIOUS RESEARCH** .................................................................................................................. 12  
   3.4  **RELEVANT LITERATURE RESOURCES** ...................................................................................... 12  
   3.5  **TRANSACTIONAL DISTANCE THEORY** ....................................................................................... 13  
   3.6  **INTERACTIONS** .............................................................................................................................. 14  
   3.7  **COLLABORATIVE LEARNING** ...................................................................................................... 17  
   3.8  **KNOWLEDGE SHARING** .............................................................................................................. 17  
   3.9  **ASYNCHRONOUS VS. SYNCHRONOUS E-LEARNING** .................................................................. 18  
   3.10 **INTERACTION EQUIVALENCY THEOREM** .................................................................................. 19  
   3.11 **MODEL OF E-LEARNING** ............................................................................................................. 19  
   3.12 **MOTIVATION AND E-LEARNING** ................................................................................................. 20  
   3.13 **IMPLICATION FOR WEB-BASED E-LEARNING ENVIRONMENTS** ............................................ 21  
   3.14 **POSITIVE INTERDEPENDENCE** .................................................................................................. 23  
   3.15 **IS DESIGN THEORY** ..................................................................................................................... 24  
   3.16 **THEORETICAL STUDY RESULTS** ............................................................................................... 27  

4  **EMPIRICAL CASE STUDY** ..................................................................................................................... 29  
   4.1  **PURPOSE** ........................................................................................................................................ 29  
   4.2  **COURSE CHARACTERISTICS** ....................................................................................................... 29  
   4.3  **INTERVIEW** .................................................................................................................................... 31  
   4.4  **INTERVIEW 1** ............................................................................................................................... 33  
   4.5  **INTERVIEW 2, 3, 4, 5** .................................................................................................................... 33  
   4.6  **EMPIRICAL STUDY RESULTS** ....................................................................................................... 35  

5  **ANALYSIS AND RESULTS** .................................................................................................................... 38  
   5.1  **COMPARATIVE ANALYSIS** .......................................................................................................... 38  
   5.2  **RESULTS SUMMARY** ................................................................................................................... 40  

6  **DISCUSSIONS** .................................................................................................................................... 43  
   6.1  **CONCLUSIONS** .............................................................................................................................. 43  
   6.2  **IMPLICATION FOR SUBJECT AREA** ............................................................................................. 43  
   6.3  **METHOD EVALUATION** .............................................................................................................. 44  
   6.4  **RESULT EVALUATION (TRUSTWORTHINESS)** ............................................................................ 44  
   6.5  **IDEAS FOR CONTINUED RESEARCH** .......................................................................................... 45  

REFERENCES ............................................................................................................................................... 46
1 Introduction

1.1 Background

Many researchers have talked about how important active engagement is for learning outcome (Brown & King, 2000). Constructivists assert that learning is happened by social engagement among people and it can be gained through dialogues and shared experiences among people. In educational systems, engagement has three faces that are student-student, student-teacher and student-content engagement. In educational literature, the word of engagement has been replaced by the word of interaction (Rhode, 2008). Researchers (ibid) have found that interactions have critical role in online educational systems based on its nature that students are geographically spread from their classmates and teachers and lack of it causes feeling of isolation among students. As a result their activities and motivations are decreased that outcome is not acceptable for institutions that offer online education (Croft, 2010).

There are many research that address different aspects of e-learning design in order to overcome above shortcomings and bring efficient learning, for example, student-centered design (Uskov, 2004), reusability of learning resources (Uskov, 2004; Wills et al., 2002; Aroyo &Dicheva, 2004), design in a way that enhance learners’ motivation (Astleitner & Hufnagl, 2003), problem-based learning (Slough et al., 2004). Herrington and Herrington (2006) contended that situated learning should be an approach in e-learning design that helps to implementation of authentic learning. According to them, elements of authentic learning are authentic context, authentic activities, collaboration, reflection, access to expert performance, multiple roles and perspective, articulation and authentic assessment. Authentic context provides a real world learning environment that students’ tasks and activities are loosely-defined. For understanding what kind of tasks and activities professional do, case based learning and videos from their professional life are provided for learners. In authentic learning, teachers’ roles have changed from the presenter of knowledge to the facilitator of knowledge. Teachers’ emphases are replaced to collaboration and team work instead of individual work and their assessments is not conducted through conventional assessment such as essays and exams but rather it is done through diagnosis, reflection and self assessment. In that regard, students’ role is replaced from passive learner to knowledge seeker. Learners learn to discover and create knowledge instead of only receiving knowledge.

Hung and chen’s (2001) design framework identifies four design considerations (situatedness, commonality, interdependency and infrastructure) for e-learning systems. Situatedness in e-learning systems is provided by internet based systems where students have access to their classes whenever they want so that they learn through doing and reflection in action. Commonality in e-learning environment should be designed in a way that learners interact with each other based on their interests in scaffolding structure. In this environment tools for collaboration and social communication should be provided. Interdependency should be created in e-learning environments, novices need knowledge of experts and experts benefit from this situation. For example, they can collect scores for sharing their knowledge or they are
known as an expert in their filed in the community. Infrastructure, learners should have access to their projects that they have engaged in through e-learning systems.

Technology advancement has provided various tools in order to promote interactions among students and teachers. By advancing asynchronous and synchronous computer mediated communication various learners’ needs are met, for example, asynchronous communication tools can be used for learning and analytical discussion while synchronous communication can provide social supports for learners (Hrastinski, 2008). Combination of both communication forms can bring high level of satisfaction; institutions by utilizing these technologies are trying to improve their distance education courses. On the other hand, universities encounter problems due to limited costs and facilities allocated to the distance education. Universities consider their resources for online courses are limited and they cannot overcome the barriers they are faced. Anderson (2003) proposes his theorem regarding these problems that universities and institutions face which is named interaction equivalency. He asserts that for having a deep and formal learning one high level interaction is sufficient instead of designing of high level of all interactions or middle level of them.

### 1.2 Statement of Problem

Increasing numbers of online students has lead to the development of online institutions and universities. By their developments, online institution administrations thought they can earn profit from the increasing number of enrollment compared to traditional schools. On the other hand, studies have shown that cost of distance education institutions is higher than the cost of traditional schools unless economies of scale are applied to the both systems (Laaser, 2008). Decreasing cost of distance education is becoming important when they are not served in high quantity.

For decreasing costs of distance education usually diminishing course instructors’ role is considered while this interaction is one of the crucial parts of education. Institutions intend to cut costs while they do not want to reduce the quality of education; this situation poses a dilemma for administrations. Anderson (2003) proposed interaction equivalency theorem as a reasonable solution for cost reduction. In his theorem, he says that for having a deep distance course only one highly qualified interaction is sufficient while other interactions can be eliminated or decreased. Based on it, educational systems can reduce instructor’s interaction whereas they can increase the other of two interactions.

Applying this theorem to e-learning design regardless of distance program’s characteristics can be problematic. The main problem is isolation that students face during their online education. In that regard, for overcoming isolation, Croft (2010) assert social connectedness is important and it can be acquired through student-teacher and student-student interactions but for reducing costs teacher interaction is needed to be reduced or eliminated.
1.3 Purpose of study

Administration of educational systems have to find a solution that meet learners’ needs and fulfill their satisfaction on the one hand and on the other hand to decrease costs in order to solve financial problems of education systems. Reducing costs through diminishing teacher’s role can be one solution. The purpose of this study is to create an understanding how e-learning designers can solve the dilemma they face through Anderson’s theorem and what design criteria should be considered for IE implementation.

1.4 Research Questions

How is it possible to design cost-effective e-learning system?

Sub questions:
- How does interdependency that is one of elements of Hung and Chen’s (2001) design framework underpin implementation of IE theorem?
- How do learners perceive IE Theorem in this course?
2 Research Design

2.1 Research Perspective

Theoretical researches are critical due to the overall perspective that they bring to the table in order to form research designing and analyzing (Krauss, 2005). The way we perceive the research and the environment of around it, lead us to the perspective choosing. The main questions for decision making for perspective choosing are what is our attitude toward the human’s behavior in our study? And how do we perceive theories?

Traditional scientific research had been approached from positivistic perspective. It has two orienting ideas, first the human behavior follows rules and second, for studying of it, natural science methods should be used (Cohen, Manion & Morrison 2007). The positivistic paradigm has the same approach to the social world that it has for natural world hence for result measuring researchers apply generalization without considering context (Nagel, 1986). However, interpretive paradigm contrasts with it fundamentally. In interpretive paradigm concentration is on individual and a method which is used is not natural science based. In positivism perspective, researcher tries to invent general theory regarding human behavior then applying them to different experiences. The aim of researcher is the theory will be known as a comprehensive rationally and people use it as a theory for daily life. However, interpretive researcher tries to comprehend phenomena based on interpretation meaning that result in subjective understanding perspective (Orlikowski & Baroudi, 1991). The ontological of interpretive is that the world we comprehend is inter-subjectively constructed from our subjective experiences. (Bhattacharya, 2008)

I chose interpretive perspective according to explanation of Cohen, Manion & Morrison (2007) that is given for interpretive paradigm “to get inside the person and to understand from within”. This thesis studies how students interact with each other and if students accept teachers’ role to be compensated for student-student interaction. Therefore, it is crucial that this research is to be conducted through students’ perspective. Students’ voices should be heard and considered what their real needs are and also to find hidden part of needs which are not told, for this reason, researchers need to get inside the students.

The second reason for choosing of this paradigm is research in distance education is dependent to the context. As Cohen, Manion & Morrison (2007) contended “in this paradigm researcher looks at context as a dynamic whole”. Students’ expectation varies based on the subject that they study, course requirements vary in different courses. For example, students’ needs in complex (analytical) courses cannot be compared to the language courses hence researchers cannot generalize findings of one study to other online institutions. Therefore, positivism paradigm which is context free and it uses generalization cannot be used in these kinds of research.

Data generation in research can be conducted through qualitative or quantitative process. Qualitative method has subjective approach, it studies the experiences and behaviors as they done, felt and lived. Data generated through words, observation, and researcher plays as a gathering information role. However, in quantitative method
has objective approach, data comes from analysis of numerical data and it is generated through questionnaire or tools to collect numerical data. The data will be generated through qualitative data in this study and triangulation employed collected data through interview, discussion board and documents (literature review).

2.2 Research Strategy

2.2.1 Case study

Case studies portray a specific instance that it has frequently potential to be applied to more general instances (Nisbet & Watt 1984). Explaining theories without any cases looks boring and also it could be non understandable. In that respect, it brings a combination of idea and abstract theory in order to make clear how to use theories in real life. A case study is a bounded system of a child, student, school and community. By studying this case we can only generalize it to the other cases in the same class or group which has the same characteristics (Cohen, Manion& Morrison 2007).

For this thesis, case study is considered as a research strategy because it studies behavior of student studying a master program in Blekinge University. It is a bounded system which presents students’ behavior of this school. They study Informatics program and they come from all around the world. Their assignment and subjects are not complex compared to difficult courses like math courses. Reading and writing in English seems the main requirement for conducting assignments and reading articles. Therefore, if other researchers tend to generalize this study to their studies, they have to consider subject of course and quantity of interaction which is needed for this course. The Findings cannot be implied to other courses that have different nature in the education style. In some courses lack of teacher-student interaction is not acceptable for students when especially courses are difficult in concept. Nisbet and Watt (1984) asserted some strengths and weaknesses of case studies.

**Strengths of Case Studies**

- Case studies are understandable easily even for non academics due to the nature of them which are written by non professional language.
- They describe reality so readers can understand what is happening in the real world.
- Control level of case studies is low; they are undertaken without any control of variables.
- Research can be conducted by a single researcher without need of research team

**Weaknesses of Case Studies**

- The possibility of cross-checking in case studies is low in that respect the result and finding can be subjective, biased and personal.
- Limitation of generalization

In Case studies, data is usually collected by observation, interviews, documents and questionnaire (Oates, 2006). By this data, researcher thrives to answer what is
happening, why it is happening or how it can be improved based on theoretical study. In this study, theoretical study provides the whole view on the distance education and how theories has been developed till now by drawing trends in this area. Empirical study also provides researcher’s observation and understating in the mentioned course that seeks to find answers for research questions. In comparative analysis, it will be demonstrated researcher’s analysis through theoretical lens in order to answer research questions based on her understanding.

2.3 Data Collection Procedures

For answering of research questions, researcher needs data. This data generated from different sources that are called data collection method. There are several data collection methods like observations, tests, interviews, documents, surveys and attitude scales. The data collection method selected for this study is interview, discussion board archives and documents that foster the validity of reported data in this study based on triangulation.

2.3.1 Interview

Interview is an interchange of views between two or more people on a specific subject (Kvale, 1996). It provides a situation that interviewer and interviewee express their own interpretation of the situation. It emphasizes the social situatedness of subjects for research data. There are different types of interviews based on the research strategy (qualitative and quantitative), they are: structured, semi structured and unstructured. In quantitative research, structured interviews are usually chosen and in qualitative research structured, semi structured and unstructured interviews can be selected for research studies (Bloom & Crabtree, 2006). Structured interview also is called standardized interview, it is conducted when interviewer follow a guideline which is provided by researcher. The same questions are asked from interviewees and the order of questions is unchanged. Qualitative research interview is usually less structured due to nature of them, in these research types, researcher needs detailed and rich answers hence semi-structured interview is chosen. In this form of interview some issues and questions are needed to be answered by interviewee while it is not important how to reach them, once desired issues are proposed by interviewee, interviewer can change the order of questions and continues the interview to the desired direction for more details which helps to the understanding of subject. Moreover, for more clarification on research subject, interviewer can add some questions by her choice at the same time.

Research question for semi structured interview are open ended questions. The answer of these questions are not yes and no. They are descriptive and it provides a situation for informant that gives more information regarding the desired situation. Questions should be designed in a way that to be consistent in the subject during the interview though it is expected from interviewer to draw information from interviewee. In these questions, conversation can be distracted easily and this is interviewer’s responsibility to control the direction of conversation.
2.3.2 Discussion Board Archives

The next method for data collection is discussion board archives. Discussion board is an environment that users post their opinions toward the questions which are raised by teachers. By reading of discussion board in this course, researcher understands who active users are in the course by the numbers of posts and how they interact with each other. Researcher by knowing the level of activity of users understands how students are motivated then according to the level of motivation they can select interview question. Answers of motivated students are richer for study. Moreover, researcher by reading of discussion board understands if students support each other and predicts how successful student-student interaction is. This overview brings a better understanding of online course for researcher after reading abstract materials and other empirical studies (Lee, et al., 2006)

There are two types of discussion board in this course. The first is link collection discussion board that users send their links to it and discuss to each other regarding the links. The second one is used for posting of some concepts that teacher asks from learners. There are four link collection discussion boards and two discussion boards for summarizing the concepts.

2.3.3 Documents

Documents are fundamental for social scientific research (Prior, 2008). Documents are divided in two groups: primary documents and secondary data (Oates, 2006). Primary documents are first hand documents which are produced by researchers for the purpose of investigation at hand. They are generated by observation and questionnaire whereas secondary documents are published or unpublished documents that are analyzed and processed by other researchers for other purposes. These documents utilized by researcher in order to precede her research.

For this research, various primary and secondary documents are used. Most of secondary documents are generated by PHD students and researchers in universities for improvement of distance educations. These documents are mainly emphasized on the users’ perception toward various forms of facilities that online communities have also, how users become satisfied in online communities and how researchers can improve the quality of interactions. In the other hand, it is needed to understand difficulties that universities face when they implement online courses and primary documents that I chose were related to IEtheorem concept and researchers who studied on this field.

2.4 Data Analysis Procedures

Data analysis techniques in qualitative studies are conducted for processing of pertained data to the research. In this qualitative research, the procedures of data analysis are:

1. Data cleaning which is pertained data is extracted
2. Initial data analysis includes to assess the quality of data
3. Main data analysis matching the available data to research questions
Final data analysis involves the whole data analysis procedures.

Generally, in research studies there are, three data categories: data that are unrelated to the research, data that has general value and data that answers research questions. Researchers intend to achieve the third data categories. For reaching to this data, data analysis procedures are employed by researchers. (Hall, 2011)

2.4.1 Comparative Analysis

Comparative analysis allows us to compare and contrast two different things (two theories, two texts, two historical figures) then researcher based on the nature of two objects decides which one is considered as a lens. For example, A is considered to be a lens that B can be viewed through it. Comparison through lens expands our knowledge toward the research by gaining insight toward both areas and then critiquing and challenging of them. For conducting comparative analysis first, the researcher finds the similarities of A and B then she writes about the differences of them. By these dissimilarities observed by researcher, she writes an argument that explains the root of these differences. (Walk, 1998)

2.5 Strategies for Evaluating Findings

Evaluation of interpretive approach refers to the concept of truth and certainty in research. Truth in qualitative research means if the situation discussed in research is reflected frankly and certainty involves if research result is based on evidence. Data triangulation employs different sources of data gathering to prove research validity. These sources can be participants, documents, teachers, other researchers, books and other articles. In this study, interview with students, documents and discussion board archives are three sources which are used for triangulation. In addition, interpretive approach is threatened because they do not have the trustworthiness level of positivistic research so Lincoln & Guda, (1985) suggested some requirements set for interpretive research for meeting trustworthiness. They are:

**Confirmability**- In this stage, researcher tries to confirm there is a correspondence between what users’ viewpoint is and what researcher has comprehended.

**Dependability**- It ensures collected data is consistent overtime.

**Transferability**- it involves if research results can be transferred to other populations or other research environments that are pertaining to desired research.

**Credibility**- It checks if research meets uniformity in different parts of research design. These parts include data sources, data generating techniques and data accuracy.

2.6 Results Presentation Method

Theoretical and empirical part is demonstrated by textual format that answers research questions. Some part of theoretical section is accompanied by tables and figures in order to help readers to understand concepts more effectively. Research uses Harvard
referencing system. The comparative analysis part is as a response to research question in textual format.

3 Theoretical Study

3.1 Key Concepts

Distance Education: Distance education, distance learning or e-learning is a form of education delivering which is conducted through technology. Students are not usually present and they are connected to their institutions through different forms of asynchronous and synchronous communication tools. Based on institutions’ facilities, they can provide different level of connectives among students and students with teachers.

Learning Community: Learning communities can be used for different purposes. For example, companies provide these communities for employees in order transfer knowledge among them and learning happens in companies more easily. Educational systems use them in order to provide an environment that integrates all learning material, resources and students work to each other. Also, some websites and groups form a learning communities based on their skills to gather professionals from the same area in order to share ideas and learn from each other.

3.2 Relevant Subject Areas

Sub-question one is supported by positive interdependence that is one of principles of situated learning theory regarding IE. Sub-question two is supported by users’ perception toward IE. As a result of these two sub question, IS design theory is created which shows what requirements are needed for design of IE in the e-learning systems.

3.2.1 Transactional Distance Theory

Transactional Distance Introduced by Moor in 1980. This theory was followed after his independent theory and teaching theory for distance education. Moore identified this theory as a measurement tool for education especially in distance education. Distance education may have negative effect on the level of students’ involvement however, in face to face educational system it could be experienced as well. Moore in this theory asserted that distance in education is pedagogical phenomena not geographical and also this distance needs to be shortened in order to improve the quality of learning (Moore, 1993).

3.2.2 Interactions

Moore (1989) suggested three kinds of interaction that form an environment in order to learning take place in for students. These interactions are: student-content and student-teacher, student-student.
3.2.3 **Collaborative Learning**

Collaborative learning is an educational approach that proposes the idea of students’ knowledge exploration by teamwork rather than transferring knowledge by teachers in education systems. Students are asked to form groups and work together in order to solve problems, complete projects. On this point, students work on various aspects of projects in their groups.

3.2.4 **Learning Communities**

Many learners know learning communities as a place that collaboration happens there but course designers use their definition for a broader range of aims. In these communities first, they provide intellectual coherence by linking classes together and bringing subject matters and making intellectual connection among them, the second purpose is to build a social relationship among students and teacher and between students. In that regard, learning communities bring more space and time for collaboration when practical tools and useful contents are prepared for learners (Smith & MacGregor, 1992).

3.2.5 **Asynchronous vs. Synchronous e-learning**

For designing successful community that learners communicate and collaborate with each other, two kinds of communication should be considered by designers. Asynchronous and synchronous e-learning applications depend on the needs of users and also learning in some situation needs asynchronous communication and some time needs synchronous communication.

3.2.6 **Interaction Equivalency theorem**

Anderson (2003) proposed his theorem regarding the standard amount of interactions in distance educational systems, in other words, how much of three main interactions are sufficient in order to achieve a meaningful learning in distance educational system.

3.2.7 **Social Interdependency Theory**

Social interdependence means outcome of individuals’ tasks are affected by her/his tasks and others’ tasks (D. W. Johnson & R. Johnson, 1989). In that regard, there are two kinds of social interdependence: positive interdependence and negative interdependence. Positive interdependence exists when individuals’ work has impact on the joint outcome with others. Negative interdependence exists outcome of individual’s work depends on the failure of competitor (Johnson & Johnson, 2009). Dependencies can be applied by organizations, environments, schools and online communities then division of assignment tasks named task interdependence is identified (Victor & Blackburn 1983), as a result students, employees people are expected to study, work together.
3.3 Previous Research

Previous empirical research studies in the area of interaction in distance education are mainly focused on the users’ satisfaction and users’ perception toward interaction types and its quality. Outside of empirical research, there are not any considerable focus on the difficulties and barrier that institutions are faced during their implementation or how they overcome these problems. In contrast, in collaborative learning paradigm, there are many researches that emphasize how to improve collaboration.

Significant research was conducted regarding IE by Jason F. Rhode named “IE in Self-Paced Online Learning Environments: An Exploration of Learner Preferences”. He tried to explore characteristics of interactions that learners used during learning experience. The main questions he used were: the interaction that learners engage most and the most valuable interaction for students. In addition, what kind of interaction learners consider equivalent and how interactions have impact on the learning outcome. The second sub research question of thesis is formed by this study.

The second research was conducted by Christian Hardless which is about designing competence development systems. In this research, IS design theory was proposed for IE that increase development reliability and percentage of success by providing principles that is derived from kernel theory that practitioners benefit from it (Jones, 2003).

The first sub research question is formed based on article named “Type of Positive Interdependence and Affiliation Motive in an Asynchronous, Collaborative Learning Environment” (Brewer and Klein 2006). In this article demonstrated how learners interact with each other through interdependency by reward and role and without roles in the environment which is based on asynchronous communication.

3.4 Relevant Literature Resources

Information, concepts and knowledge for thesis are chosen from several books, articles, videos and PowerPoints but in relevant literature resources, I chose the most important articles that have been published by prominent scholars otherwise I had to write more pages and also brought names of unknown researchers that I learnt from them more than published articles. The way that I chose for the selection of resources was browsing keywords through online Borås and Blekinge library.

Keywords: distance education interactions, teacher-student interaction, student-student interaction, student-content interaction, IS design theory, situated learning, teacher’s role, collaborative learning, Interaction equivalency, interdependency distance education, reward, cooperative learning, students’ perception, motivation, games learning, isolation, online communities, and virtual communities.

David W. Johnson and Roger T. Johnson, 2009 article: “An educational psychology success story: Social interdependence theory and cooperative learning” was published in Educational Researcher. They are prominent brother scholars who work on the cooperative learning.

Jason F. Rhode, 2009 article: “IE in Self-Paced Online Learning Environments: An Exploration of Learner Preferences” was published in The International Review of Research in Open and Distance Learning and cited 30 times.

Nicholas Croft, Alice Dalton & Marcus Grant 2010 article: “Overcoming Isolation in Distance Learning: Building a Learning Community through Time and Space” was published in Journal for Education in the Built Environment.

Raven M. Wallace 2003, article: “Online Learning in Higher Education: a review of research on interactions among teachers and students” it was published in education, communication and information.

Stefan Hrastinski, 2008 article: “Asynchronous and synchronous E-learning” was published in Educause Quarterly. He has worked on the difference between asynchronous and synchronous e-learning significantly; this article is cited 97 times.


Terry Anderson, 2003 article: “Getting the Mix Right Again: An updated and theoretical rationale for interaction” was published in The International Review of Research in Open and Distance Learning. This article proposes IE theorem for the first time and it is cited 233 times.

Susan Brewer and James D. Klein, 2006 article Type of Positive Interdependence and Affiliation Motive in an Asynchronous, Collaborative Learning Environment was published in Educational Technology, Research & Development.


3.5 Transactional Distance Theory

Moore proposed three components for transactional theory, by knowing them and changing them, the level of quality can be improved (Wallace, 2003). They are:

- Dialogue
- Structure
- Student Autonomy

In dialogue, the importance of communication between teacher and student was presented. Teacher instructs contents and students respond to the teacher.
Improvement in the learning hinges upon increasing level of communication between teacher and student. Therefore, in course design, instructors should attempt the sufficient amount of dialogue takes places between student and teacher.

Structure is related to the course design. In this component high level of structure means student has less control on her/his learning, hence the level of student’s engagement decreases. For example, novice learner needs more structure than experienced learner. For shortening the transactional distance, the level of structure needs to be minimized. In student autonomy, student can take control over their studies and institutes also can provide this opportunity for students in order to take control of their learning. It consists of educational goals, manner of teaching, and rate of progress and method of assessment (Giossos, Koutsouba, and Lionarakis, 2009).

3.6 Interactions

3.6.1 Student-content interaction

The first interaction model of Moore is student-content interaction. Basic teaching materials are highly required for all forms of education. Moore (1989) asserted that student-content interaction is the most important interaction and without it learning would not happen in distance education. By utilizing contents which are provided by teachers and help of them, knowledge construction is formed by students. In early days of distance education, the interactions with contents were limited to the textbooks. Students used them and teachers helped them in order to overcome the difficulties. These days, students still spend most of their time with contents but by advancing technology, various types of contents have been introduced to the human life. These contents used by students are reading informational texts, watching instructional videos, interacting with multimedia, participating in simulations, using cognitive support software, doing the assignment and working on projects (Abrami, et al. 2011). The primary task of distance educators should be choosing the content that meets learners’ needs.

3.6.2 Student-teacher Interaction

There are many studies that show a connection between learning outcomes and teachers’ activities. Verbal communication of teachers for example, giving praise, humor and self-disclosure and non-verbal communication for example, body language (eye contact and facial expressions) are critical factors which are important for increasing of learning outcomes. The above mentioned communications are used in traditional education (Bouhnik & Marcus, 2006). In distance education, other types of interactions are available for students and teachers that are different from traditional education. Moore in transactional theory posits that for decreasing transactional distance in distance education, communication among students and teachers should be increased. Therefore, courses are usually designed in a way that promotes communication among student and teachers. Dialogs are usually made via emails, discussion boards and video conferencing. Based on facilities (different media) that they (students and teachers) have and also needs of both sides, dialogs are made. These abovementioned media have different level in transactional distance shrinking. For example, students use video conferencing feel they are more connected to their teachers and classmates while when they use email they don’t have
this level of connectivity to their teachers. Teacher presence and her/his interaction with students are important for enhancement of student motivation in all form of learning either traditional or distance (Hrastinski, 2008).

3.6.2.1 Teachers’ roles

Designing an online course is time-consuming and extensive as compared with traditional courses. Discussion group, team work, lectures and all other tools used in traditional educational system dramatically different from online courses. The main question for instructional designer designing a course is what teacher’s role is in this course (Wallace, 2003). Attending in discussion boards, assessing students work and teaching are the main responsibility of teachers in distance education but how it should be done in online courses is still problematic. Tables below show teacher’s role, three categories demonstrated, Instructional organization and facilitating discourse and direct instruction (Anderson et al.’s 2001).

**Instructional Design and Organization**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Curriculum</td>
<td>“Next week we will have video conferencing, please be prepaid for that…”</td>
</tr>
<tr>
<td>Designing Methods</td>
<td>“For link collection, each student should comment for other students’ links. Comments should be reasonable and based on the presented links”</td>
</tr>
<tr>
<td>Establishing Time Parameters</td>
<td>“Send your assignments by the end of this week…”</td>
</tr>
<tr>
<td>Utilizing Media Effectively</td>
<td>“In network learning assignment you have to address questions that other students have not raised those questions”</td>
</tr>
<tr>
<td>Establishing Netiquette</td>
<td>“Keep your message short, respect others’ opinion, Please, read other posts and discuss with your classmates, for finding teammate do not send email to all students, use discussion board for finding teammate”</td>
</tr>
</tbody>
</table>

*Table 1: Coding scheme for Instructional Design and Organization Anderson et al.’s (2001)*
### Facilitating Discourse

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying areas of agreement/disagreement</td>
<td>“Joe, Mary has provided a compelling counter example to your hypothesis. Would you care</td>
</tr>
<tr>
<td>to respond?”</td>
<td></td>
</tr>
<tr>
<td>Seeking to reach consensus/understanding</td>
<td>“I think Joe and Mary are saying essentially the same thing”</td>
</tr>
<tr>
<td>Encouraging, acknowledging, or reinforcing student contributions</td>
<td>“Thank you for your insightful comments”</td>
</tr>
<tr>
<td>Setting climate for learning</td>
<td>“Don’t feel self-conscious about ‘thinking out loud’ on the forum. This is a place to try</td>
</tr>
<tr>
<td></td>
<td>out ideas after all”</td>
</tr>
<tr>
<td>Drawing in participants, prompting discussion</td>
<td>“Any thoughts on this issue?” ”Anyone care to comment”</td>
</tr>
<tr>
<td>Access the efficacy of the process</td>
<td>“I think we’re getting a little track off here”</td>
</tr>
</tbody>
</table>

**Table 2: Coding scheme for Facilitating Discourse Anderson et al.’s (2001)**

### Direct Instruction

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presenting contents, asking questions</td>
<td>this power point shows learning organizations, what is your idea about communication in these</td>
</tr>
<tr>
<td></td>
<td>organizations.</td>
</tr>
<tr>
<td>Focus the specific issues on the discussion board</td>
<td>I think we have to continue on the difference between organizational learning and learning</td>
</tr>
<tr>
<td></td>
<td>organization</td>
</tr>
<tr>
<td>Summarizing the discussion board</td>
<td>the main issues was proposed by Johan and Linda. You have to try to raise analytical</td>
</tr>
<tr>
<td></td>
<td>questions. Questions should be prepared in advance.</td>
</tr>
<tr>
<td>Diagnose the misconceptions</td>
<td>Different perspective should be considered. For example, students providing knowledge from</td>
</tr>
<tr>
<td></td>
<td>different sources, internet, articles and books.</td>
</tr>
<tr>
<td>Responding to the technical concerns</td>
<td>“If you want to send message for your fellow classmates, you have to ….”</td>
</tr>
</tbody>
</table>

**Table 3: Coding scheme for Direct Instruction Anderson et al.’s (2001)**

3.6.3 **Student-student Interaction**

Moore asserted the third form of interaction is student-student interaction. Studies show that the basic form of interaction in traditional classrooms is student-student interaction. Students in this interaction learn from each other, find solutions for their problems that they are faced during their studies (solving their problems together).
By utilizing this interaction, knowledge level regarding to the desired content becomes equal among students which is called collaboration. Moreover, students by communication with each other can benefit from social support of each other. Collaboration and social support which are result of student-student interaction are two critical factors for future development of e-learning. Also, student-student interaction would change our thinking in future. (Gunawardena & McIssac, 2003)

3.7 Collaborative learning

Learning is an active process: in this approach, learning is constructed through engagement and active process rather than traditional approach that students are passive. Student’s responsibility is not to take only new ideas and concepts which are offered by teachers but rather they are asked to construct something new by the information and knowledge that is transferred to them.

Effective learning in rich context: Effective learning occurs in a context that learners are asked to solve a problem and education is based on students’ activities. Teachers create a challenge for students by posing a problem and students start their activities by solving a problem. Students’ roles shift from distant observer to active practitioner. Rich context encourage students to expand problem solving.

Learning is a social process: in collaboration learning, learning happens through talking. Students know for reaching to the desired outcome, they have to propose their ideas through talking and as a result different ideas bring intellectual synergy (Smith & MacGregor, 1992).

3.8 Knowledge Sharing

There are different definitions for the term of knowledge. Drucker (1989) distinguishes between information, data and knowledge and stresses that knowledge is specialized by definition. Siemens (2006) contends that knowledge rests in an individual and resides in collective. A distinction which is made about knowledge in literature is difference between explicit knowledge and implicit knowledge. Explicit knowledge is a systematic knowledge that is codified in formal language while implicit knowledge is difficult to formulize and to communicate. Knowledge sharing in learning communities transforms individual implicit knowledge into explicit community knowledge and again transforms community’s explicit knowledge to individual’s implicit knowledge. This transformation of knowledge increases knowledge in community and innovation ability among learners as well. Institutions by establishing learning communities and promotion of technology provide advance knowledge sharing among learners (Wei, 2009). In this research, learning community (discussion board) has an important role in knowledge sharing.
3.9 Asynchronous vs. Synchronous e-learning

3.9.1 Asynchronous e-Learning

This type of e-learning communication is defined information exchange by using e-mail, discussion board or other forms which does not need both sides at the same time to have access to internet and to be present. This is the main reason that people take e-learning course besides their work and family responsibility. Learners login to their schools and download files and articles which are uploaded by their teachers whenever they want. Moreover, Students’ contributions to discussions are more thoughtful due to having sufficient time for thinking and producing knowledge in their courses compared to synchronous e-learning (Hrastinski, 2008).

3.9.2 Synchronous e-Learning

The media for this kind of communication are video conferencing and online chatting. This type of online communication helps the development of online learning communities. These communities have impact on the decreasing level of learners’ isolation by bringing sense of being member of a community rather than contacting only with computer. Moreover, it avoids difficulties by providing presence of both sides at the same time hence; the problems and ambiguities will be solved after online communication (Hrastinski, 2008).

Haythornthwaite (2002) asserted three types of communication in E-learning: content related communication, planning of tasks and social support. Firstly, Content related communication is regarding content and materials which are offered by teachers. It plays a crucial role, for overcoming frustration regarding your studies, sharing your ideas and exchanging information. Secondly, planning of tasks, communication is utilized by students when they start working together. For assigning tasks, coordination, negotiation and overcoming conflicts they use it. Thirdly, social support is usually used when students advise each other or talk about unrelated study subjects. According to Stefan Hrastinski (2008) and above definitions, in asynchronous media usually texts are related to the content however; in synchronous media usually texts and communications are about task planning and social support. Based on his definition, he suggested two concepts regarding communication category, personal participation and cognitive participation.

3.9.3 Cognitive Participation vs. Personal Participation

Cognitive participation includes reflective participation which is response to complex issues in e-learning while personal participation is for less complex issues are for example, course planning and social support. If your participation is centered around cognitive, your media dimension is toward asynchronous e-learning and when your communications are centered on personal participation; your media dimension is toward synchronous e-learning.
3.10 Interaction Equivalency theorem

Anderson’s (2003) theorem explains that for achieving a deep and meaningful learning is not necessary to have high level of three interactions but instructional designers can implement courses in a way that only one interaction is at high level then the desired learning will achieve with little loss in educational effectiveness. He explained that the reason for proposing of IE theorem is due to a dilemma that designers are faced. For them, there is a tradeoff between humanization of online educational system and keeping the implementation cost low. This situation is always threatening instructional designers’ positions; therefore, his suggestion is that by providing a high level of one of interactions and decreasing the level of other interactions or even elimination of other interactions, the quality of distance education will not drop significantly.

For studying students’ perception toward IE there is a must that one or two of interactions be in the high level. For this reason, in this part is sought to show why student-student interaction in this course is at high level. As empirical study chapter shows most of assignments need students to work together and read others assignment and leave comment and discuss with each other about their ideas on assignments. This collaborative working is the result of interdependency exists in the course design. The interdependency brings students together in order to conduct their assignments. They form their groups and start their collaboration hence, student-student interaction improves. In the following pages, it is showed how interdependency is constructed from its requirements in this course and how students are interconnected by interdependency in the course.

3.11 Model of e-Learning

The figure 3 shows two different interaction models for distance educational systems that designers should decide for their systems in advance. In collaborative learning systems, materials and sources are accessible through web in different formats. For instance, lessons are presented in videos, audios, online conferences, chats and virtual worlds. Nonetheless, some students want to be directed and sequenced by teachers therefore, there is possibility that students are guided by teachers and other students. Also it is expected from students to follow the schedule due to the nature of teamwork.
and collaboration. Learning communities establish relationship among students and develops social skills among students. In these communities, only a limited number of students are registered because facilities offered by universities can serve limited number of students. The next model is independent study and tools which are used in this model are demonstrated. Virtual labs, simulations and e-books are some examples of these tools that are utilized by students in this model. Students in these models follow their educations by themselves and unlike the previous model there is no considerable amount of student-teacher interaction.

In this research, learning happens in learning community. Contents are offered by teacher in the community and students have this opportunity to make a relationship with other students and discuss about their assignments, project and problems faced although, collaboration is part of assignments and without collaboration is not possible to meet course criteria.

![Diagram of learning models](image)

**Figure 2:** (Anderson, 2003)

### 3.12 Motivation and e-learning

E-learning is a form of independent learning, active learning and self-directed learning which is different from traditional learning happens in classrooms (Simons, Linden & Duffy, 2000). In order to study in this kind of educational systems, students should be self-regulated which requirement for it, is motivation. For this reason, for implementing a persistent educational system for learners, instructional designers should try to design courses in a way that motivate learners in order to conduct their assignments and complete their courses (ibid). There are some significant evidence that level of connectedness among students has impact on the motivation of students.
for course completion and the learning experience. (Garrison, 2003; Su, Bonk, Magjuka, Liu, & Lee, 2005; Swan & Shih, 2005, Rhode, 2008).

Studies show that students with high intrinsic motivation have more explorative characteristics in their studies and they are more curious than students with extrinsic motivation. It does not mean that high intrinsic motivated students work harder than other student but rather they tend to do different things. In that regard, statistics shows that high intrinsic motivated students did not achieve success educational records more than the other groups (Martens, Gulikers & Bastaens 2004).

3.13 Implication for web-based e-learning environments

Hung and Chen’s (2001) design framework identifies four principals of learning and from them, it guides design consideration for e-learning.
<table>
<thead>
<tr>
<th>Principles of situated cognition and Vygotskian thought</th>
<th>Design considerations for e-learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situatedness</strong></td>
<td>• E-learning environments should be Internet or web based so that with such a common networked platform, learners can access the learning environment in their embedded and situated contexts – anywhere and anytime.</td>
</tr>
<tr>
<td>• Learning is embedded in rich cultural and social contexts – acquiring both implicit and explicit knowledge.</td>
<td>• E-learning environments should be portable as far as possible so that they can be used in the context.</td>
</tr>
<tr>
<td>• Learning is reflective and metacognitive, internalizing from social to the individual.</td>
<td>• E-learning environments can focus on tasks and projects, thus enabling learners to work through doing and reflection-in-action.</td>
</tr>
<tr>
<td></td>
<td>• E-learning environments can focus on depth over breadth, thus enabling learners to analyse communicative ‘speech acts’.</td>
</tr>
<tr>
<td><strong>Commonality</strong></td>
<td>• E-learning environments should create a situation where there is continual interest and interaction through the tools (e.g. mind-tools) embedded in the environment.</td>
</tr>
<tr>
<td>• Learning is an identity formation or act of membership.</td>
<td>• E-learning environments should capitalize the social communicative and collaborative dimensions allowing mediated discourse.</td>
</tr>
<tr>
<td>• Learning is a social act/construction mediated between social beings through language, signs, genres and tools.</td>
<td>• E-learning environments should have scaffolding structures which contain the genres and common expressions used by the community.</td>
</tr>
<tr>
<td><strong>Interdependency</strong></td>
<td>• E-learning environments should create interdependencies between individuals where novices need more capable peers capitalizing on the zone of proximal development.</td>
</tr>
<tr>
<td>• Learning is socially distributed between persons and tools.</td>
<td>• E-learning environments should be designed to capitalize on the diverse expertise in the community.</td>
</tr>
<tr>
<td>• Learning is demand driven – dependent on engagement in practice.</td>
<td>• E-learning environments should be made personalized to the learner with tasks and projects as embedded in the meaningful activity context.</td>
</tr>
<tr>
<td></td>
<td>• E-learning environments can track the learner’s history, profile, and progress and tailor personalized strategies and content.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>• E-learning environments should have structures and mechanisms set up to facilitate the activity (project) processes where learners’ are engaged in.</td>
</tr>
<tr>
<td>• Learning is facilitated by an activity – driven by appropriate mechanisms and accountability structures.</td>
<td>• E-learning environments have the potential to radically alter traditional rules and processes that were constrained by locality and time.</td>
</tr>
</tbody>
</table>

Figure 3.4: Learning principles and design considerations (Hung and Chen, 2001: 8).

Figure 3: (Hung and Chen, 2001)
3.14 Positive Interdependence

Outcome, means and boundary are three categories for positive and negative interdependence (Johnson & Johnson, 1989, 2005a). According to them, outcome interdependence is used in cooperative or competitive tasks. It can be a group goal in organizations, schools and institutions or a reward. Generally in educational systems, we can assume this outcome as passing a course or specifically achieving a grade which has a reasonable motivation for students.

The second category is means interdependence. It includes roles interdependence, task interdependence and resources interdependence. In distance education, roles can be considered a student who finds contents, a student who proposes her/his ideas and a student who leaves a comment for others’ works. Task interdependence is a chain reaction and labor division when a party finishes its work another part starts it work. Resources interdependence exists when each party has a small part of information and data which is needed for task completion.

The last category is boundary interdependence. It can be identified by

1. Environment: People in different rooms can be separated from each other and discontinuity is formed. In distance education, students who work on the same area (field) can be separated from other students.
2. Similarity among people: For example, students who wear similar clothes. In distance education, it can be considered students who come from the same country or states or they are from the same sex.
3. Expectation of working together in a group from students who are not expected to work in a group (ibid).

3.14.1 Individual Benefits of Positive Interdependence

- Individual’s motivation for hard work increases because individual knows that teammates’ outcomes are dependent to her/his work.
- Listening to various opinions, ideas and reasoning lead individual makes better decisions and thinks critically.
- Individual’s stress decreases due to team work

In this research, author shows these three interdependences exist in the course. Creation of interdependence helps students to be interrelated to each other and it brings motivation for course completion when teacher’s role is not highlighted.
3.15 IS design theory

The term of IS design theory refers to theories that is used for designing of effective information systems and development of it. It shows relationship among developers, clients and users (Churchman, 1979). According to Walls et al. (1992), IS design theory is composed of three components a set of user requirements, a set of system features and a guideline for system development. A design theory that Walls et al. explicated has two characteristics: first, it is based on theory; second it brings guidance to practitioners. The first objective of Walls et al is to provide a package of guidance for practitioners who have the same circumstances and the second is to generate design and development process based on kernel theory in the same situation (Hardless, 2005).

IS design theory is prescriptive rather than descriptive, it tries to provide practical and general guidance to developers. The success of IS design theory can be measured by the extent to which they bring success for design and development process. Moreover, a good IS design theory provides a combination of socio-techno guidance instead of only socio perspective or only techno attitude toward projects (Hradless, 2005). Theory which IS design is composed of it, is known as a kernel theory. Kernel theory can be an academic theory or a theory which is result of empirical studies. By selection of kernel theory, researcher identifies requirements for the research. After providing requirements for research then they transform to design guidelines.

Svensson and Östlund (2007) outlined a techno pedagogy framework based on design concept of IS design theory for distance education. Hardless (2005) defined the design concept as an intermediate conceptualization role between design theory and concrete prototype. He used a design concept for a general idea regarding competence system development. The kernel theory which they used is situated learning. In that regard, Svensson and Östlund (2007) chose a tentative framework that demonstrates a series of organized activities (narrative structure) which is related to the genre they have chosen. Their framework is organized as a table with three rows that are form, content and functionality which these concepts were defined by Shepherd and Watters (1998) as characteristics of cybergenre. They showed narrative structure graphically for example, rectangle shows information activity and circle depicts communication activity, by turning a rectangle 45 degree changes from teacher-centered information activity to the student-centered activity. A special point shows a synchronous activity when students needs to be guided by teachers.

Svensson and Östlund (2007) outlined a techno pedagogy framework based on design concept of IS design theory for distance education. Hardless (2005) defined the design concept as an intermediate conceptualization role between design theory and concrete prototype. He used a design concept for a general idea regarding competence system development. The kernel theory which they used is situated learning. In that regard, Svensson and Östlund (2007) chose a tentative framework that demonstrates a series of organized activities (narrative structure) which is related to the genre they have chosen. Their framework is organized as a table with three rows that are form, content and functionality which these concepts were defined by Shepherd and Watters (1998) as characteristics of cybergenre. They showed narrative structure graphically for example, rectangle shows information activity and circle depicts communication activity, by turning a rectangle 45 degree changes from teacher-centered information activity to the student-centered activity. A special point shows a synchronous activity when students needs to be guided by teachers.

Figure 4: Graphical illustration of the symbols used to describe the narrative structure of techno-pedagogical genres (Svensson & Östlund 2007)
In the following page, two techno pedagogic genres (web lecture and blog reflection) are discussed (ibid). These frameworks help practitioners who want to design and develop their distance education based on web lecture and blog reflection which was introduced by Svensson and Östlund.

**Web Lecture**

The first activity in web lecture starts by publishing of lecture file that explains important concepts based on text books by teachers. Then it is continued by lecture notes which are used as a lecture preparation. The next step is the lecture that consists of teacher video (student controlled video stream), animated slides and table of contents. The last module of lecture allocated to assignments that students should work on. Assignments are explained and tutored in discussion forum; finally students receive the result of their works.

<table>
<thead>
<tr>
<th>Narrative Structure (Form)</th>
<th>Pre-Lecture Material</th>
<th>Video Lecture</th>
<th>Coaching</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content (Substance)</td>
<td>Study Guide and Lecture Slides containing:</td>
<td>Modularized information of subject matter.</td>
<td>Student-student and student-instructor interaction</td>
<td>Teacher's individual feedback to students</td>
</tr>
<tr>
<td></td>
<td>Presentation of central concepts. Supplements to lecture readings. Examples and exercises. Support for lecture notes.</td>
<td>Presentation of Students' assignment(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Genre framework for Web Lecture (Svensson & Östlund 2007)

**Blog Reflection**

The aim of this assignment is students to express their idea regarding the documents that they read. The first activity is started by publishing of a video which is related the concepts and theories related to the subjects. Then students join to discussion rooms start discussing together related the mentioned subjects. Then they publish their idea about the concepts and theories in the blog, other students read reviews and write their ideas regarding the published post. Final stage, teacher reads all reviews and reflections regarding the concept.
### Table 5: Genre framework for blog reflection (Svensson & Östlund 2007)

In the following pages, researcher depicts how three category of interdependence that exists in “Communication in Learning Organizations” assignments underpins IE implementation. In addition, for more clarification the link collection genre framework brings a concrete example how this assignment is implemented then the thesis develops IS design theory for support of IE.
3.16 Theoretical Study results

The result of theoretical study is presented by questions and answers which try to support research questions.

How can advanced technology affect student-teacher interaction?

Distance education is becoming one of the most preferred media for learning and transferring knowledge and it experiences fast changes due to technology. Some of the theories that mentioned above proposed in the era that technology had not reached to its advancement that we experience today; three forms of interactions and transactional distance theory are from this period. Transactional distance suggested ideas for overcoming distance exists in distance education and interactions theory of Moore, helped institutions in order to improve the quality of education. Advancement of technology has caused considerable changes in learning and educational systems. Learning has become more convenient and joyful by using new technologies like learning software, games, videos and audio. Learning does not acquire many kinds of text books and direct teaching but rather by using these new technologies learners experience collaboration and studying with advanced tools. By advancing of asynchronous and synchronous technologies learners are connected easily and they can work and solve their problems collectively also they can receive support from other learners which is very valuable compared to period that distance educators do not have this opportunity and learning is conducted by each learner.

All of these technology advancements have provided new opportunities for institutes and as a result they offer a variety of high quality courses hence, they can save their resources on areas that they had to allocate resources to them. One of these areas is teaching that by this level of innovation in educational system tools, institutions can allocate its budget to other areas, for example, employ higher advanced learning management system that brings more collaboration. Collaboration among students can bring situation that students learn from each other and do their assignments. For collaboration, students required student-student interaction and it helps that students based on these interactions build relationship with other students and try to solve problem together that they face in their education instead of communication with their teachers therefore, Importance of teachers’ role can be diminished due to various sources of learning. Their role can be substituted for student–student interaction which is brought by communities that encourage collaborative learning among students and contents that are essential part of education. In other words, teachers’ roles can be replaced by student-student and student-content interaction.

As we saw, the idea of substitution of interactions comes from interaction equivalency’s Anderson (2003) although he believes that one high level interaction is enough for deep learning. However, in this study, researcher wants to study perception of students toward interaction equivalency. She seeks to understand what students’ perception are toward the diminishing role of teachers in this course when course design encourages collaboration among students and utilizing contents which are offered by teacher.
How does positive interdependence affect motivation and learning?

As we saw, sense of relatedness among students increases students’ motivation. Consequently, students are encouraged to spend more time in learning communities for making relationship, discussing about projects and working together. By the same token, Martens et al (2004) showed that high intrinsic motivated students are not more successful than other groups. It shows that motivation and learning are two different concepts can be used in distance education. Motivation produces joy hence students are stimulated to complete their courses but research showed that learning outcome is not different from the other groups.

Task interdependent assignments deliver high level of relatedness among students so students become motivated to start common projects with their classmates. Their social skills are enhanced in learning communities and informal learning happens but studies show that learning outcomes which are based on educational grades do not improve.

RQ1: How do interdependent assignments help to implement IE Theorem?

As mentioned before, positive interdependence is divided to three categories: means, outcome and boundary. Three requirements of means interdependence are roles, task interdependence and resources. Task interdependence which is one of requirements of means interdependence regardless of its design promote collaboration for which is needed student-student interaction. Also, role and resources plays a crucial role in the formation of this connectivity among students. Other forms of interdependency (outcome and boundary) helps that distance education environments become more interrelated among students. In high interdependent assignments, a need for high degree of student interaction becomes highlighted then IE can be employed by institutions.

RQ2: How do learners perceive IE Theorem in this course?

According to theories in distance education, such as three forms of interactions and constructive learning in one side and isolation feeling the other, it is expected that students will not be satisfied by utilizing IE for institutions. Learning based on constructive learning is a social process and students desire to have more social activities in order to learn more effectively and to overcome isolation and loneliness feelings but researchers need to explore how they can diminish teacher’s role while the quality of distance education does change dramatically. They seek to understand learners’ perception when institutions intend to implement equivalent interaction for teacher-student interaction. Interdependency one of the principles of situated learning theory as a kernel theory is utilized in this thesis in order to show how it helps learners learn when teacher’s interaction decreases.
4 Empirical Case Study

4.1 Purpose

Theoretical theories in this thesis show what researchers have thought about distance education by providing abundance of theories. Institutions due to rapid changes can offer many opportunities to learners and their systems but they have to test in advance if new changes that they want to employ are compatible to their systems because new changes pertain to learners’ interactions, perceptions and program characteristics. In that regard, this empirical study intends to study if IE is compatible to learners’ needs in this program.

4.2 Course characteristics

Course “Communication in Learning Organizations” is a 15 credit course. This course includes five assignments that have a specified deadline for the whole assignments by the end of semester. The course is offered in “its learning” environment that is a learning management system provided by Blekinge University.

4.2.1 Its learning

Its learning (its learning, 2012) connects students and teachers in virtual environment. It brings a highly qualified student-student, teacher-student and student-content interaction. It provides various forms of asynchronous communication by discussion board, email system, sending message, blogs and also synchronous communication via adobe connect for students and teachers.

4.2.2 Adobe Connect Pro

Adobe connect pro is a software used in e-seminars that are scheduled by teachers. It connects teachers and students by a synchronous communication.

4.2.3 E-portfolio and Blogs

E-portfolio is another tool which is offered by its learning. It allows you to show your digital identity, publish your school works and write blog (its learning, 2012). It helps students to know each other and they benefit from reading of other students’ school works and their blogs. Also, readers can add their comments in the webpage.
4.2.4 Link Collection

For this assignment, students are expected to provide six links regarding to the different subjects of the course. Students should construct an explanation for their links and also related question. Questions have to be chosen in a way that stimulates further discussion with other students. Then link collection is supposed to be sent to the discussion area. Grading system of Link collections is fail and pass. In each assignment, there is a link collection (except assignment five) that students based on the subject provide link collections.

4.2.5 Article Review

In this assignment, four articles are suggested that students choose one and review it. In review, students answer questions that are asked by teacher. Students are expected to suggest improvement to the article’s author and also find defects of papers. These defects include weak argument, missing facts and wrong structure.

4.2.6 Network Learning

In this assignment, students are expected to write a report regarding the suggested subjects by teacher. Each student chooses one subject, for writing of report some questions come to their minds and they need some information. They have to formulate their questions and propose their questions in her/his page in discussion board. Also, other students do this process. Students have to become member of two networks at least which are close to their subjects. Becoming member of networks helps students to write their reports by using knowledge of other students. Students answer to the other students’ questions and other students do that. Students from the same network have knowledge about the same subject. Hence, we have an accumulated knowledge which has been produced by students in a network. Each student gathers information in her/his network then writes a report.
4.2.7 **Collaboration**

In this assignment, it is expected that student collaborate with each other. For the first part, students should formulate their questions regarding the evaluation of supporting technologies and write some pages. In the next part of assignment each student should continue by on her/his own as a personal work.

4.2.8 **Course assignment**

In this assignment, students write hand book about the course content. The final assignment is course assignment and it should be conducted by each student separately.

4.2.9 **Discussion Board**

It is an environment that students present their link there. They post their link collections which are four assignments and questions related the articles. Moreover, they expect they receive comment from other students.

4.2.10 **Participant Selection**

For this study, convenience sampling is selected due to the characteristics of course matches the purpose of the study. For this reason, all learners who enrolled at the course which was held on spring 2011 were eligible to attend to the interview. The interview was done spring 2012 and researcher did not consider students’ grades. Therefore, invitations were sent to all of students who attended the course. Four students responded to the invitations.

4.3 **Interview**

The reason for choosing of Blekinge University was that the researcher is the student of this program and as result contacting with teacher, program coordinator and students was really convenient. Teacher in this program helped researcher by providing some guidance about the course and probable changes needed to be applied for the course. She also attended in interview that made clear some aspects of distance education which was hidden for researcher. Moreover, researcher benefited from knowledge of an expert who works for a program and knows students habits in distance education.

The next stage for interviewer was how to choose questions. Based on the type of interview, interviewer wanted to know about the interaction habits among students whereas there was possibility that interview direction would change due to the nature of qualitative interview hence, the questions were selected carefully in order to meet researchers’ aim. The questions for teacher and students were almost the same.

1. What form of assignment is the most useful for you?

   - Choosing links for link collection
• Discussion board of link collection - The sharing of links and feedback for discussion purposes were very useful.
• Article review
• Network learning
• Collaboration with your classmate (Item 4)
• Writing a handbook (Item 5)

2. Do teacher activities motivate you for pursuing course? If yes, what form of teacher activity motivates you for doing your assignment?

• Sending an email that encourages you to start your activity. for example teacher send an email” time is ticking in the beginning of this course”
• Presence of teacher in discussion boards
• Recording videos for students

3. For improving of “Communication in Learning Organizations” course, what is your idea?

• Omitting link collection instead of it teacher introduces articles related to the course and making discussion according them.
• Adding more assignments which require collaboration among students
• Teacher provides more recorded videos regarding course subjects.
• Teachers should be present in discussion boards
• Voice and video chat with students and teacher simultaneously

4. How much teacher’s activities are important for your motivation in this course?

• Not at all (I am highly motivated)
• A little bit
• I become motivated for finishing my assignments by teachers activity

5. How much collaboration with your classmate activities is important for your motivation in this course?

• Not at all (I am highly motivated)
• A little bit
• I become motivated for finishing my assignments by collaboration with other classmate

6. How much articles and course materials in your course are important for your motivation in this course?

• Not at all (I am highly motivated)
• A little bit
• I become motivated for finishing my assignments.
4.4 Interview 1

The first interview is conducted with teacher of the course. Her role in this course is course responsible and facilitator. She as a course responsible believes in “learning by doing” hence she tries to provide situation for students to learn most of lessons by themselves hence, students in link collection assignment learn to find links by themselves instead of ready links that could be provided by teacher. Her response toward the most important assignment for learning was that the collaboration (student-student interaction) part is the most interesting assignment for students and in addition, most of negative feedbacks were received for this assignment. Students chose network learning as the next informative assignment that could learn many new things. Moreover, her suggestion toward course improvement was to increase the level of collaboration among students. Finally, she added that teacher’s interaction as a support role in distance education is not effective once specific time is allocated for all of students hence, teachers should contact student directly in order to solve students problems.

4.5 Interview 2, 3, 4, 5

These are the answers of interview questions for four students, who attended the course. The first interviewee is fulltime student. She chose writing a handbook as the most useful assignments for her learning and also she chose network learning as the next answer. She emphasized collaboration is the best part of studying while it has its problems. She told “Some students are busy with their responsibilities in their life hence they can’t meet deadlines and follow the assignment with their group mates”. She would rather teachers have presence in discussion board as a listener and control discussion in order not to be distracted from its direction. It motivates students for more reasonable discussion. She suggested for course improvement adding more assignments that require collaboration that results in effective learning. For question number 4, she considers teachers’ activities are not important for her motivation in order to finish the course or for participating in the course however she believes that collaboration is the best motivation for finishing her course. For the last question, she chose number three as her answer of this question; it means that articles and course materials have impact on the level of her motivation.

The next interviewee is working fulltime; she is busy with her work and does not have enough time in order to follow her studies. Her response for the first question was writing a hand book. For answering question 2, she had a response per option. She evaluated sending an email is helpful and overwhelming, “It helps I become motivated and also to become overwhelmed”. She assessed the presence of teachers in the discussion board supports students during their discussion and also recording videos helps students not to lose their direction toward the subject goal. Once again, she expressed her opinion for all of options in question number 3, for option one it is not really different for her either the omission of link collection or existence of link collection. She holds a positive view toward collaboration though she underlines time differences is a big issue sometimes. Moreover, she thinks “videos which are provided by teachers help students to attain direction in their studies”. Her response for question number 4 is that she becomes motivated for the finishing of her assignments.
Her answer for question number 5 was that she becomes motivated by collaborative assignments. Moreover, course materials are not important for her in order to finish the course or not.

Interviewee number 3 does not have a good internet connection in order to be interviewed. He works fulltime and hopes master degree brings to him a better social situation for him. The questions are sent to him by mail and he answered questions. He prefers handbook assignment. His answer for the second question was that sending an email encourages him in order to start his work. His recommendation toward the course improvement was link collections to be omitted and teacher introduces the links that are related to the course by her choice. Moreover, by answering three last questions he highlighted three forms of interactions play a crucial role for his learning.

Interviewee number 4 works fulltime as an IT manager and she has all responsibilities as a housewife. She said “The handbook was the most useful to me; it covered all the pertinent areas involved in the topic.” In addition, she assessed sending an email as a motivating tool that helped her in order to start her assignments. She evaluated course improvement “I think more teacher presence would be the most useful improvement, the course perhaps could have teacher assistants assigned for this also”. Among three types of interaction, she chose the student-student interaction as the most significant motivation tool in order to be involved in the course.
### 4.6 Empirical Study Results

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Presence of teacher in discussion Boards. Alarm email triggered her in order to start her work</td>
<td>Presence of teacher in discussion Boards. And also recording videos for students. It helps I become motivated and also to become overwhelmed</td>
<td>Presence of teacher in discussion Boards and alarm email helped her.</td>
<td>Sending an email</td>
</tr>
<tr>
<td>Q2</td>
<td>Adding more assignments which require collaboration among students</td>
<td>Adding more assignments which require collaboration among students</td>
<td>Teachers should be present in discussion boards</td>
<td>Omitting link collection instead of it teacher introduces articles related to the course and making discussion according them.</td>
</tr>
<tr>
<td>Q3</td>
<td>A little bit</td>
<td>I become motivated</td>
<td>A little bit</td>
<td>I become motivated for finishing my assignments by teachers activity</td>
</tr>
<tr>
<td>Q4</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
</tr>
<tr>
<td>Q5</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
<td>I become motivated for finishing my assignments by collaboration with other classmate</td>
</tr>
<tr>
<td>Q6</td>
<td>I become motivated for finishing my assignments</td>
<td>A little bit</td>
<td>A little bit</td>
<td>I become motivated for finishing my assignments</td>
</tr>
</tbody>
</table>

Table 6: Empirical result

The course based on its design (various forms of assignments) compared to other courses in the mentioned program has the high level of student interaction hence, researcher assumed that by evaluation of students’ perception toward the collaboration and teacher’s activities can decide if learners accept IE or not. Questions are chosen in a way that students reflect their needs for example, they can show if they want more collaboration or teacher’s activities. If they want more collaboration it shows that teacher’s interaction can be compensated for student-student interaction.

All of students chose handbook for question one. They considered handbook as the most useful assignment among various forms of assignment they had. For question two they (3/4 of students) chose teacher presence in discussion board is the most important activity that motivated students for doing their assignments. Question 3, the responses were different but two of them chose collaboration. Question 4, 5 and 6
shows what students think about three kinds of interactions. All of students become
motivated by collaboration and then the second place is for the content and teacher
interaction.

• How do interdependent assignments help to implement IE Theorem?

The design of “Communication in learning organization” is a way that student-student
interaction is at high level. Link collections in this course bring power and freedom
for users in selection of articles for suggested subjects by teacher. Students choose
articles by themselves and write a description and some questions that are relevant to
their articles and post it on the discussion board. Six articles should be proposed by
students per link collection. Students leave their comments for link collections that are
submitted by other students. Commenting on assignments are graded hence students
are encouraged to leave comments for other students and also the students who
present their links are encouraged to choose links and propose questions that
remaining students become promoted for commenting on their links, as well links,
descriptions, questions and comments are evaluated and graded by the teacher.
Receiving comments and writing comments are two actions that are expected from
students. All students are expected to receive comments once they present their links.
Students who know each other and have collaboration experiences with each other
usually leave comment for each other. This comment exchange usually happens
among students.

In “communication and learning organization” course students learn from each other
by collaboration. Collaboration and relatedness highlighted in this course due to
interdependency, teacher’s interaction is not as highlighted as student-student
interaction. Students initiate their work through guidelines per assignments which are
provided by teacher and follow instruction then they would go through contents. The
next process after understanding of new concepts is to become familiar with other
students or find their previous teammates in order to form their groups for teamwork
and also informal learning. If they don’t find any previous teammate they will seek to
get familiar with new students, they usually write some lines about their preferences
regarding desired assignments, if other students find it desirable they reply them.
They start collaboration with either previous teammate or new classmate. This kind of
relatedness and collaboration compensate for diminishing teacher’s role and it can be
used for overcoming of unhighlighted role of teachers.

How do learners perceive IE Theorem in this course?

Students chose handbook as the most useful assignment in this course, students
recognized that they utilized all the knowledge that they learn during the semester. In
other words, students believe that the learning outcome in assignment 5 (handbook) is
at the high level in which there are not any form of collaboration and student-teacher
interaction. The handbook is written by utilizing of the contents which is offered by
teacher in the course. According to the questions two and three and students’ answers,
presence of teachers in discussion boards and also sending emails are two activities
that are maximizing motivation level of students and also half of them chose
collaboration as an improvement option for this course. Question number 4: half of
students affirm that by teacher interaction they become motivated. Question number
5: All of students admitted that they become motivated by collaboration. Question
number 6: half of students become motivated by the type and quantity of course materials and contents are introduced by teachers.

Half of students suggest collaboration for course improvement while among options direct teaching and teacher presence in discussion boards are available as well. It shows that for them collaboration is more vital than direct teaching and teacher presence. In addition, they don’t have positive attitude toward elimination of link connection that instead of it teachers introduce contents which are equal for all students. Among the most significant motivating interaction they chose collaboration, by considering question three and comparing with the result of other questions we can decide that collaboration has an important role in motivation.
5 Analysis and Results

Frame of Reference

The frame of reference for comparative analysis is sub research questions which are addresses in theoretical and empirical result.

Grounds for comparison

A ground for comparison introduces comparative nature of my thesis. Theoretical part constructs whole view regarding diminishing teachers’ role in distance education. It introduces new theory which can be beneficial for institutes. The empirical part investigate a case that if new theory can be employed by educational systems. In the comparative analysis part is an attempt to identify better understanding regarding research sub questions which proposed in theoretical and empirical part through comparison.

5.1 Comparative Analysis

- How do interdependent assignments help to implement IE Theorem?

Outcome interdependence which is one of positive interdependence category, in link collection assignment is passing the course or achieving good grades which stimulate students for establishing their relationship and working together. Both student groups who present their links and leave comments expect to meet requirements for passing the course. For example, as we can see in the figure 1, right rectangle has an outcome; the outcome is reasonable and analytical discussion among students which brings a good score hence both students seek this outcome to happen in their boundary.

As demonstrated before, the next category is means interdependence that includes roles, task interdependence and resources. Roles in this course are student (initiator) who proposes her links and the other side is a student (commenter) leaves a comment for her work. Therefore, initiator and commenter are two roles that students have in discussion board. Initiator presents her articles and writes a description and some questions then commenter leaves a comment, after some while roles swap. The initiator becomes commenter and commenter becomes initiator. Task interdependence in this assignment is implemented by designer as a result; all students need each other’s feedback for achieving the course outcome. Based on this design, students are interdependent to each other. Resources are the links collections, descriptions and questions that each student presents and comments that are left by commenter.
The third category is boundary. In this assignment it is identified by students who are expected to work to each other. Commenter starts commenting; initiator receives comment and goes to the commenter page then roles swap. In that regard, boundary is a unity that it is composed of initiator and commenter. For example, the borders of both rectangles show the positive interdependency boundaries.

Studying behavior of students in the above-mentioned assignment revealed that there is a positive interdependence among students. Students form it due to design of link collections assignment. Creating interdependency among students leads to the collaboration that boosts student-student interaction that is the main desire of online institutions. Institutions seek to implement their courses in a way that they promote interactions. In that regard, “Communication in Learning Organizations” enhances student-student interaction. By having high level of student-student interaction, the prerequisite for IE is met and as a result this theorem can find a ground in order to be applied.
• **How do learners perceive IE Theorem in this course?**

According to the empirical findings, students chose handbook as the most significant assignment among their choices while as it was showed teacher and student interactions are not needed in this assignment. Students believe that the learning outcome in assignment five is more effective than other assignments. They conducted this assignment without collaboration with other students whereas they did other assignments collaboratively. Their responses for question number two and three were showed that they suggested teacher’s presence in discussion board can be the most useful teacher’s activity in this course and collaboration for course improvement. Moreover, remaining responses for other questions, demonstrated that student-student interaction brings motivation compared to content interaction and teacher interaction.

As it is mentioned in theoretical studies, motivation can be enhanced through connectedness and relatedness, within this environment students are underpinned to complete their courses and have joyful learning experiences. In that regard, empirical result (question one) shows that students believed that motivation for course completion and learning outcome are two understandable concepts for them. In other words, they understand that learning will not be achieved only by providing motivation for students but rather motivation is something that they need for course completion and learning experiences as mentioned in theoretical part.

Based on the differences between learning outcome and motivation, it is expected that learners will not face any problem in learning outcome when teacher interaction is decreased or even eliminated and at the same time collaboration and content interaction will be maximized; now we know that interactions provide motivation for students and it can be compensated by other form of interactions. Expressly, lack of teacher’s interaction has impact on the degree of motivation which can be replaced by collaboration or content interaction. Hence, IE theorem can be employed by institution when perquisites are met.

**5.2 Results Summary**

Based on theoretical and empirical result and comparative analysis, these points are obtained.

• In Hung and Chen’s (2001) design framework, four principles are considered for e-learning design that designers should consider them in their designs. This thesis shows how interdependency that is one of principles of their design framework is implemented in link collection assignment. Then it describes how interdependency enhances student-student interaction. In that regard, tentative framework shows how link collection should be implemented in order to meet learners’ needs when IE is implemented. It based on its design provides connectedness among students that increases motivation. Also, its discussion board provides knowledge sharing among students, as mentioned before it transforms implicit to explicit knowledge. Totally, assignments in “Communication in learning organizations” bring a good combination that neglect low degree of teacher interaction. Tentative framework of link collection by
interplaying among structure, content and functionally utilize integrated design instead of separate design agendas (Svensson & Östlund, 2005). In that regard, interdependency is considered as a kernel theory that has important role in implementation of IE.

Table 7: Genre framework for link collection

- Analysis of sub question one identifies that in order to maintain motivation of students during the semester, grades (outcomes) should be proportional to the students’ expectation. For example, if grades cannot motivate students, teachers should consider higher grades for collaboration and teamwork.

- Analysis of sub question two illuminates that learning outcome and motivation in distance education are needed for learners in order to be successful in their studies. Without motivation learners cannot complete their assignments and without learning outcome they cannot meet requirements for passing the course. In that regard, connectedness is needed for increasing motivation and it can be achieved through student-student interaction and student-teacher interaction. Moreover, empirical study shows that student-teacher interaction can be compensated for student-student interaction. Finally, institutions should consider that low level of interaction without IE cannot achieve high quality education.
The below figure shows characteristics and requirements for implementation of IE, the second column matches by set of design and development principles based on interdependency which proposed in Hung and chen’s design framework as Hardless (2005) used for developing project management competence. This combination proposes IS design theory for IE implementation in e-learning systems that is the main contribution of this thesis.

<table>
<thead>
<tr>
<th>Characteristics and requirements of IE</th>
<th>Design and development principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving student-student interaction</td>
<td>Design positive interdependence in assignments, it includes Outcome, means and boundary interdependence. In this course, it is obtained through link collection assignment. Students should receive feedback from their classmates.</td>
</tr>
<tr>
<td>When IE is supposed to be implemented, teachers’ role should be substituted for student and content interaction. Students need an environment that practice the relevant knowledge and attain knowledge that could be achieved through teachers before and they know that they are interdependent.</td>
<td>Design for knowledge sharing which is provided in link collection board by publishing links and questions. As mentioned before, in that board students publish their links and a summary of their articles and some interesting questions about their articles.</td>
</tr>
<tr>
<td>Learners need communication regarding their assignments.</td>
<td>Design for discussion groups board. In this discussion board students can discuss about other assignments except link collection. This board is not considered in this assignment.</td>
</tr>
</tbody>
</table>

Table 8: IS design theory for support of IE
6 Discussions

6.1 Conclusions

Distance education undergoes profound changes due to technology advancement. There are various forms of tools employed by institutions that enhance the quality of education. Institutions intend to develop their tools and technologies in their courses but their financial resources are limited for this reason. The first solution for overcoming limited resources is to decrease the number of teachers so that IE theorem is introduced to distance educational systems in order to substitute teacher interaction for student-student and student-content interaction. In that regard, the aim of thesis is IS design theory for support of IE which is obtained through theoretical and empirical part that seeks to explore users’ perception toward this cost-effective solution when the level of interdependency among students is high.

In theoretical part, various profound theories in distance education are proposed. Transactional theory, different forms of interactions mainly emphasizes on the importance of interaction in educations. Hardless by defining design concepts in competence development systems and Svensson by employing this concept to distance learning explicated tentative framework for web lecture and blog reflection in e-learning design. This study by using kernel theory of interdependency (one of principles of situated learning theory) outlines a tentative framework for link collection which is one of fundamental assignment in this course for IE implementation. Genre framework depicts how link collection is implemented in this course. Moreover, researcher proposed IS design theory for support of IE that is gained through learners’ perception toward the mentioned course. It shows what requirements are needed for implementation of IE in courses and what design and development principles are required for its implementation.

6.2 Implication for subject area

The study provides insights for institutions intend to design distance education for the first time and also for those who intend to change their educational systems and redesign cost-effective e-learning. The strength of the study is to describe the construction of interdependent assignments by techno-pedagogical design and IS design theory in Blekinge University which has brought satisfaction for students. Consequently, institutions by reading this study can understand learner’s behavior toward IE and interdependent assignments. The interdependency model shows how students interact with each other and it emphasizes the importance of interdependency among students that designers can borrow its idea. Moreover, next group that obtain benefits from this study are those instructional designers who seek to design effective learners’ interactions in online communities for students, employees and any form of online participants, combination of theoretical and empirical can provide a guideline for them.
6.3 Method Evaluation

For theoretical study, due to the nature of study related to informatics and psychology, many texts between these two areas searched and read. Instructional, interaction design and information system design theory is part of informatics and also motivation and interdependency is part of psychology field. For conducting research, two concepts comprehended separately then the combination of both concepts (interaction design, IS design theory and interdependency) was searched. Each concept includes the broad area while the combination of both areas is a small part. For this reason, theoretical and empirical resources are limited for the first sub research question. For the second area, due to nature of IE that does not follow previous theories make a difficult situation to find articles regarding it.

Distance education is constructed for learners and their attitudes toward it help instructional designers to design educational systems based on their needs. The interview method as a data generation is valuable because it transfers learners’ opinion toward the system they work. In this study five interviews are conducted that interviewer gained insights toward e-learning system. Researcher gained different ideas from different perspective (teacher and students) which is valuable. Since, interviews with students were semi structure interview, researcher tried to address questions. Students wanted to talk more and explain difficulties that they faced during their studies. Language barrier was the main problem that interviewee faced during the interview.

6.4 Result Evaluation (Trustworthiness)

As described in 2.5, for truth and certainty in data generation of this thesis, triangulation is chosen. Triangulation uses different sources in order to study if the data has been generated is valid. For this purposed, Interview and documents were chosen. For the purpose of trustworthiness, Lincoln &Guda (1985) proposed a set of criteria that explained in following lines.

**Credibility**- it is used for measuring of trustworthiness in this study. The research strategy (case study), data generation (interview and documents) and data analysis (comparative analysis) were chose in a way that author can interpret qualitative data confidently. Author due to being students of Blekinge University, had this chance to organize interviews with students and teacher of course. Interviews with students reflect real students’ experiences in program, strengths and weaknesses they feel during their studies. An interview with teacher expresses purpose of the selection of each assignment. Moreover, author by studying in this school since last year gained insight during her studies regarding the concepts and experiences of distance education.

**Transferability**- shows that if findings of this research are applicable to other context. For applying findings to other contexts, we have to consider the characteristics of desired program. For example, programs which have different nature like mathematics or physics cannot use these findings. Mentioned programs are teacher’s interaction intensive that learners need teacher’s interactions for overcoming
the problems regarding complex concepts. Accordingly, institutions that offer programs which have the same characteristics (informatics) can employ these findings to their designs.

6.5 Ideas for continued Research

The IS design theory which is proposed in this research is obtained through requirements for IE and design and development of those requirements. The kernel theory used is interdependency that is one of principles of situated learning. The kernel theory in further research should be changed to the situated learning which includes four disciplines (situatedness, commonality, interdependency and infrastructure). Situated learning kernel theory provides more comprehensive knowledge through implementation of IE. Moreover, studying another case study that teacher interaction is substituted for student interaction will illuminate more requirements for IE which leads to successful IE implementation.
References


47


University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the School of Business and IT (HIT), we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has a closeness, both between students and teachers as well as between industry and education.

Our courses in business administration give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our IT courses, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The research in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in InnovationLab, which is the department’s and university's unit for research-supporting system development.