Learning to Learn in e-Learning

Constructive Practices for Development
Abstract


This thesis concerns technology use in distance educations and learning practices related to this use. The research was carried out over the period 2005 to 2009 in Bangladesh and Sri Lanka and has been reported in 6 published papers. The research is situated within the field of Information and Communication Technologies for Development (ICT4D) and within this field e-learning. Education is important for development and for many students in developing countries distance education is often the only option to get educated. The research question is if the use of Information and Communication Technology (ICT) in distance education can contribute to development, and if so, how?

This question is explored through two case studies in Sri Lanka and Bangladesh. A variety of data collection methods have been used: interviews, questionnaires, participant observations and document review. The research approach is interpretative and findings are analyzed using Structuration Theory.

Initial findings showed that a major challenge for students was the change of learning practices that distance education required. Findings also showed that new constructive learning practices emerged through the use of ICT. For development to take place the learning practices of students are important. Students used to learning practices based on uncritical memorization of facts will not easily take initiatives for change, whereas students used to constructive learning practices will. Notwithstanding the fact that most students found this transition challenging, it was found that by introducing technology into long-established transmission structures, changes towards constructive learning practices occurred.

A major contribution of this thesis is to increase the understanding of how ICT in distance education can facilitate constructive learning practices. By arguing that constructive learning practices are conducive to societal change this finding also has implications for development. The thesis also makes a theoretical contribution by extending Structuration Theory’s applicability in demonstrating its explanatory power in settings where researcher and informants are geographically and socially distant.

Keywords: ICT4D, distance education, constructive learning practices, Structuration Theory, ICT, developing countries, e-learning.
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Anton (then 8 years old): “Mum, you shouldn’t say that it is pointless what you do! I have told all my friends at school that you are saving the world.”
Annika: “For Gods sake, I am not saving the world! I am writing stupid things about education!”
Anton: ”But Mum, don’t you know that education saves the world?!”

Annika Andersson, Örebro, March 2010
Publications


Related Publications

Andersson, A. “An Analysis of how Underlying Ideas of Development are Reflected in Education and Possible Roles for ICT.” In J. S. Pettersson (Ed.), Defining the 'D' in ICT4D: Graduate papers on development, globalisation, and ICT (pp. 45–56). Karlstad: Karlstad University, Department of Information Systems, 2009.


Abbreviations

BIT Bachelor of Information Technology
BOU Bangladesh Open University
BVC Bangladesh Virtual Classroom
eBIT External Bachelor of Information Technology
ICT Information and Communication Technology
ICT4D Information and Communication Technologies for Development
IS Information Systems
IT Information Technology
LMS Learning Management System
SMS Short Messaging Service
UCSC University of Colombo School of Computing
## Contents

Part I. THESIS SUMMARY ........................................................................................................... 15

1. Introduction .......................................................................................................................... 17
   1.1 ICT4D ............................................................................................................................... 17
   1.2 Distance Educations and ICT .......................................................................................... 19
       1.2.1 Definitions of Distance Education and e-Learning .............................................. 21
   1.3 e-Learning Technologies and Pedagogy ........................................................................ 22
       1.3.1 The Role of Technology ......................................................................................... 25
   1.4 ICT – a Facilitator for Pedagogical Change? .................................................................. 26
   1.5 Two Distance Education Programs in Bangladesh and Sri Lanka ............................... 31
   1.6 Research Aim ................................................................................................................ 32
       1.6.1 The Reason to Focus Practices ............................................................................... 34
   1.7 Structure of the Cover Paper ........................................................................................... 35

2. Method .................................................................................................................................. 37
   2.1 Research Approach .......................................................................................................... 37
   2.2 Research Design .............................................................................................................. 39
   2.3 Literature Studies ............................................................................................................ 41
   2.4 Case Study Research ...................................................................................................... 42
   2.5 My Case Study Method – Choices and Reasons ............................................................... 43
       2.5.1 Personal Motivation ................................................................................................. 43
       2.5.2 Selection of Cases ................................................................................................... 44
       2.5.3 My Role in the Cases ............................................................................................... 45
       2.5.4 Selection of Informants ......................................................................................... 47
   2.6 Data Collection ................................................................................................................ 48
   2.7 Limitations ....................................................................................................................... 52
   2.8 Data Analysis .................................................................................................................. 53
   2.9 Structuration Theory ...................................................................................................... 54
       2.9.1 Structuration Theory in Information Systems Research ......................................... 58
       2.9.2 Empirical Application of Structuration Theory ....................................................... 64
       2.9.3 Using Structuration Theory as Analytical Tool ...................................................... 65

3. Case Studies ......................................................................................................................... 71
   3.1 Sri Lanka: eBIT ............................................................................................................... 71
   3.2 Bangladesh: Bangladesh Virtual Classroom ..................................................................... 78
4. Theory ......................................................................................................................... 85
  4.1 Theories of Development ....................................................................................... 86
    4.1.1 The ‘D’ in ICT4D ......................................................................................... 92
  4.2 Education and Development ............................................................................... 94
    4.2.1 Social Change Education ............................................................................. 97
    4.2.2 Constructive Learning Practices and Development .................................... 102
  4.3 ICT4D and Education ......................................................................................... 105
5. Result ....................................................................................................................... 109
  5.1 Results of the Individual Papers ........................................................................... 110
  5.2 ICT’s Potential Contribution to Development .................................................... 115
6. Summary Conclusions ............................................................................................... 119
  6.1 Contribution ......................................................................................................... 121
  6.2 Credibility Concerns Related to Case Study Research ....................................... 127
  6.3 Limitations and Future Research ........................................................................ 130
7. Concluding Remarks ................................................................................................. 133
References .................................................................................................................... 135

Part II PUBLICATIONS ............................................................................................ 151

Paper II: Seven Major Challenges for e-Learning in Developing Countries: Case Study eBIT, Sri Lanka
Paper III: Letters from the Field: e-Learning Students Change of Learning Behaviour in Sri Lanka and Bangladesh
Paper IV: Increasing Interactivity in Distance Educations: Case Studies Bangladesh and Sri Lanka
Paper V: Learning e-Learning: The Restructuring of Students’ Beliefs and Assumptions about Learning
Paper VI: Learning from e-Learning: Emerging Constructive Learning Practices
Part I. THESIS SUMMARY
INTRODUCTION

1.1 ICT4D

This thesis is positioned within the research field Information and Communication Technologies for Development (ICT4D) and thus seeks to investigate how Information and Communication Technology (ICT) can make a difference for development (Heeks, 2008; Prakash & De’, 2007; Unwin, 2009).

The difference that ICT can make, in any societal sector, is often described based on different stages or categories. Behn (2007) describes four phases where ICT can enable information provision – making existing facts and knowledge more widely available; automation – work that previously was done manually is done electronically; reengineering – radical redesign of existing processes; and, innovation – new and unprecedented strategies by way of analyzing information in new ways.

Similarly, Sein and Harindranth (2004) provide some examples of how ICT can be of use in development. One way is to substitute old technologies with new, e.g., using a computer to send an e-mail instead of writing a letter and using a postman to deliver it. Another use for ICT can be to enable an increase of a phenomenon, e.g., people communicating more. This can for instance enable more accurate diagnoses made by doctors by allowing them to get second opinions from other doctors. The use of ICT can also facilitate larger societal changes. An example can be how new possibilities to communicate with government can lead to a more open and democratic society.
Using technologies for development is not something new – technological innovations such as the telegraph or the radio have previously been used for development (Kleine & Unwin, 2009). What we today call the ICT4D field, however, emerged as a response to the enormous possibilities of mass communication that came about after the huge spread of personal computers, the Internet and mobile phones. A short historical overview of this new ICT4D field describes a broad chronology according to three different phases (Heeks, 2008):

I. ICT4D 0.0: The first and very scarce uses of ICT for development (from the 1950’s to 1990’s) where ICT was by large ignored as something to do with development. Uses mainly concerned the computerization of internal administrative processes in public sector and later the private sector via international companies.

II. ICT4D 1.0: From the mid 1990’s to around 2005, with the introduction of Internet and the Millenium Development Goals (MDGs), the interest for ICT4D increased. The use of technologies for development was often glorified and uses of ICT were targeted towards the objectives in the MDGs (e.g., education for all, end poverty, combat Aids, gender equality). Telecentres with computers connected to Internet via landline became the role model for many of these projects.

III. ICT4D 2.0: After many accounts of failing ICT4D projects and with the avalanche-like increase in mobile phone use a new era for ICT4D is starting to emerge. In realizing that the use of Internet-connected PCs rarely gives service to deprived communities, increasing interest is taken in low-cost terminals, wireless access and low power consumption. The use of available technologies such as radio, TV and mobile phones are increasingly emphasized.

As the above chronology shows, our ICT4D field is relatively new and it has therefore often been the subject of debate (Ezer, 2006). Critical studies on ICT4D have claimed that the field has a technologically deterministic approach (Heeks, 2008) or that the ideas about technology and needs are used as a disguise to reinforce old power relations between masters and slaves (Granqvist, 2006). There are also many accounts on ICT4D projects not leading to any social or economic development (Avgerou & Walsham, 2000), where the connection between the “ICT intervention and achieved developmental benefits are both hard to predict and to realize” (Johansson-Hedberg, 2007, p. 5).
Nonetheless, even if the euphoria about the potentials of ICT for development that took place at the end of the 1990s and early 2000s (Kleine & Unwin, 2009) was exaggerated, the last decade’s debate has started to change from the question *if* ICT should be used to *how* it should be used for development (De’ & Ratan, 2009; Ezer, 2006; Harindranth & Sein, 2007; Walsham, Robey, & Sahay, 2007). It is now seen as more important to “understand the nature and complexity of information systems (IS) implementations in socioeconomic development efforts” (De’ & Ratan, 2009, p. 260).

1.2 Distance Educations and ICT

Within the field of ICT4D I have focused on technology use in distance education. Education is an essential foundation for development (Bada & Madon, 2006; Selinger, 2009; WSIS, 2003), much because of the close relation between education and other development initiatives:

“There is a growing realization that education enhances the investments made in almost every other aspect of the development effort. Agricultural production among poor farmers has been found to be 25% higher among those with even four years of schooling” (Barke & O’Hare, 1991, p. 52).

The problems for most developing countries are, however, that admissions to universities are limited and that the people most in need of education are often the ones needed at home or at work. A solution to the problem would be to allow people to learn where they are and thus much hope is set on distance education, lately much supported by the use of ICT1. The hopes set on ICT relate to a) improved access to education (e.g., reaching more students), and b) improved quality of education (e.g., change of learning practices).

**Improved access** is important for governments struggling to meet a growing demand for education while facing an escalating shortage of teachers (UNESCO, 2006). With ICT governments see a potential of reaching more students with fewer teachers available. Hopes are also set on the potential to reach marginalised groups in outstation areas and people who are working (Dhanarajan, 2001; Grönlund, Andersson, & Hedström, 2005; Gulati, 2008).

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1 Throughout this thesis I will use the terms “distance educations supported by ICTs”, “ICT-supported distance education” and “e-learning” interchangeably. A further elaboration of the terminology is found in a subsequent section.
Outreach is, however, a problem. The ambition to disseminate education to rural areas and the poorer parts of the population has rarely been fulfilled (Berman, 2008; Grönlund et al., 2005; Tiene, 2002). In a large survey on distance education in south Asia it was found that distance education in the poorer parts of Asia often only reaches urban, middle-class men (Dhanarajan, 2001).

Many of these problems relate to a particular concern for ICT4D: the unequal distribution of technologies and all inequalities relevant to understanding differences in their use – usually referred to as a digital divide (Johansson-Hedberg, 2007; Walsham et al., 2007). We need to be aware that while ICT brings opportunities for development they can also marginalize large groups that do not have access to them (Qureshi, 2006). In this way the introduction of technologies is a “two-edged sword” where technology also can be used by the rich to “retain their positions of economic, social and political power” (Unwin, 2009, p. 2). But even in cases where there is access to technology and e-learning is available, we often find very low completion rates. Drop-out rates from e-learning educations are usually much higher than in traditional, classroom based, teaching (O’Connor, Sciford, Wang, Foucar-Szocki, & Griffin, 2003; Romiszowski, 2004; Simpson, 2004).

**Improved quality** concerns e-learning’s potential to improve the educational system (Selinger, 2009). The improvement can be to fundamentally transform learning practices (Garrison & Anderson, 2003) by moving away from an educational tradition where students regard the teacher as an expert that teaches and not as a facilitator for his or her learning (Eastmond, 2000; Evans, 2005; Garrison & Anderson, 2003; Rajesh, 2003; Sehrt, 2003). Distance educations and e-learning can involve a change in the system of learning by moving away from a teacher centred educational tradition with passive students to a learner oriented approach where the students take ownership of their learning (Govindasamy, 2001; Siritongthaworn, Krairit, Dimmitt, & Paul, 2006; Zhang, Zhao, Zhou, & Nuna-maker, 2004).

In many developing countries the transmission model of education is still very common (Selinger, 2009). The education culture is also often authoritarian which undermines the learner centred approach advocated in e-learning (Burn & Thongprasert, 2005; Pagram & Pagram, 2006; Usun, 2004). A consequence for the students is therefore that the transition to the e-learning paradigm is neither easy nor immediate. Many studies (e.g., Andersson, 2008a; Ismail, 1991; Mar, 2004) on the introduction of e-learning into transmission-based educational systems have
shown that students desire a learning structure similar to the traditional one because they lack the confidence for self studying:

“These learners, unfamiliar with an ICT enhanced learning environment, often are reluctant to use technologies like radio, television and computers in the teaching–learning process. Many teachers and learners in rural areas are often not readily receptive to the introduction of new technology-centered learning process, and would prefer to continue to rely on traditional memorization-oriented learning process” (Mar, 2004, p. 161).

This shift in learning culture was also identified to be a major problem for distance students in my case studies in Sri Lanka and Bangladesh and that is why this thesis came to have this focus. In both these countries the traditional educational model is that of transmission and learning by memorizing and both projects that I have taken part in have had the aim to move away from this model to a more constructivist one with the use of ICT. The challenge that the educational organizations face is not only to technically add functions that facilitate a move away from the transmission model, but rather to change the very structures of educational thinking.

The transmission approach to education is of course not only restricted to developing countries. In the West we have definitely experienced it in the past (it is our legacy that many developing countries are experiencing) and at many places still today. All over the world much teaching “is still based on the theory that students will learn if we transmit information to them in lectures or present it to them online” (Ramsden, 2003, p. 10). Support for this change of learning culture is therefore one of the most crucial factors for success of e-learning (Bollag & Overland, 2001; Ismail, 1991; Lorenzi, MacKeogh, & Fox, 2004). A relevant question for ICT4D then is if technology can support this change. Maybe ICT use in education can be an example of how “traditional top-down models of information flows in development can be subverted by the anarchic potential offered by the internet and mobile telephony” (Kleine & Unwin, 2009, p. 1053).

1.2.1 Definitions of Distance Education and e-Learning

In this thesis, e-learning refers to distance educations that take use of ICT. E-learning refers to ICT-supported distance educations where the education is formal and where the ICT can be anything from radio and TV to mobile phones and computers. There is no limitation in regards to how much of the course is
delivered through technology – the technologies can be used to deliver “some or all of a course” (Oblinger & Hawkins, 2005, p. 14).

Distance education is not a new concept; education that is carried out with the teacher and student being separated by space (by the aid of letters) has its roots going back at least some 150 years (Usun, 2004). Distance education can thus be defined as “any formal approach to learning in which a majority of the instruction occurs while educator and learner are at a distance from one another” (Verduin & Clark, 1991, p. 8). With the introduction of ICT in distance education, students and teachers are still separated in space, but not necessarily in time (Keegan, 1995).

Distance education has most often taken on the form of mass production by drawing on the benefits of scale and outreach. Thousands of students can be enrolled in, what is seen to be, a cost-effective manner. The benefit for the students is the increased flexibility in that they can learn while working, for instance, and at what time and pace they prefer.

E-learning is often viewed as a sub-category to the larger phenomena of “learning technology”, “educational technology” or “technology-enhanced learning” – all with the common theme that they are supposed to support innovations in teaching and learning (Oliver, 2000). The technologies are usually defined as ”those tools used in formal educational practice to disseminate, illustrate, communicate or immerse learners and teachers in activities purposively designed to induce learning” (Garrison & Anderson, 2003, p. 34). If we look at the particular definitions of e-learning when they are used in the meaning of learning at a distance we find yet another set of definitions. The terms used are online learning, distance education, distributed learning, virtual learning, web-based training and so forth (Ally, 2008; Romiszowski, 2004). The term e-learning has become an overall term covering most forms of education where ICT is involved and where there is a distance between the learner and the teacher.

In relating back to the question if and how technology can be of use in a pedagogical transformation we need first discuss how technology has been designed to support different pedagogical ideals.

1.3 e-Learning Technologies and Pedagogy

A categorization of different generations of educational technologies in distance education can be based on the technologies used and when so is done the categorization is most often described in a linear, chronological order, ranging from
three to five different generations\(^2\) (Cooper, 1993; Garrison & Anderson, 2003; Taylor, 2001). These descriptions do not, however, provide a realistic picture because one technology is not immediately replaced by another. Rather, we usually find a mixture where all different generations are in use: “[t]here are still many examples of first- and second-generation distance education systems and technologies serving thousands of learners across the globe” (Garrison & Anderson, 2003, p. 34).

Since this research takes an interest in many different technologies and also pedagogical aspects a different categorization, beyond technology generations, is needed. An alternative is to base the categorization on theories of learning instead to see how these theories have been mediated through technology (Shoib, Walsham, Barrett, & Cappleman, 2004; Cooper, 1993). Three broad development phases are identified\(^3\): behaviourism, cognitivism and constructivism. It is important to point out that there are no clear cuts between the use of these pedagogies in e-learning either. As will be made visible in the case study descriptions, different pedagogical ideas can be supported during the same course or program delivery. An e-learning environment built on applications for immediate response and encouragement can support behaviouristic ideals, whereas e-learning applications for individual exploring and group communication support a constructivist model.

Bearing these limitations in mind, my discussion will mix both the technical and the pedagogical phases and sketch out three positions (with some chronological bearing).

**Behaviouristic applications of technologies:** The pedagogical underpinnings of the first computer learning systems were mainly behaviouristic where complex learning parts are divided into smaller chunks of understandable and testable material (Ally, 2008; Garrison & Anderson, 2003). Behaviourism builds on the idea that learning outcomes are observable and that students respond to external stimuli. For instance, a video recording of a teacher giving a lecture can be the external stimuli and computer applications such as automated tests can be used as tools.

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\(^2\) Typically: 1st generation – use of print material, 2nd generation - use of print, audiotape, videotape, computers, 3rd generation - use of videoconferencing and TV/Radio Broadcast, 4th generation – use of interactive multimedia online, Internet access to resources, computer mediated communication etc.

\(^3\) In the Shoib study (Shoib et al., 2004) four phases are described where social theories of learning are separated from constructivist learning. I have chosen to combine them due to their close relation.
for response. In behaviouristic models, reinforcement – or immediate feedback on performance – is the backbone for learning (Cooper, 1993; Shoib et al., 2004). This kind of feedback is only feasible when a small portion of learning is being evaluated. The first uses of educational technology thus mainly concerned task-based applications with reinforcement in the form of feedback providing the students with an indication of whether the answer they gave was correct or incorrect. Students are expected to work on their own, and the only interaction that takes place is between the individual student and the teacher (or, with more advanced technology, with a computerized application). In the Sri Lankan case underlying this thesis these kinds of behaviouristic applications are frequently used for self-assessments of single, rather simple, skills.

Cognitive applications of technology: As more powerful technologies emerged distance educations could be supplemented by more multimedia such as video lectures, virtual laboratories and simulators. Many of these computer applications were built around cognitive learning ideals (Ally, 2008; Garrison & Anderson, 2003). Cognitive theorists do not see knowledge as coming from outside, but from the student’s own interpretation. The students’ internal mental models are seen as tools for how they interpret what they hear, read or observe. To help students understand (“facilitation”) is as important for the cognitive theorist as reinforcement is for the behaviourist (Shoib et al., 2004). Thinking and reflection are seen as important and applications should help the student to “perceive and attend to the information so that it can be transferred to working memory” (Ally, 2008, p. 23) and thereafter be retrieved from long-term memory. This idea manifested itself in learning technology in how interface design was seen as very important. For one thing, interfaces are urged to be intuitive in order to not give the students too much cognitive burden. Consideration is given to the location of objects on a webpage and how information should be managed in chunks, typically in units of 7 +/- 2 (Ally, 2008). The interest in cognitive learning theory also opened up for the use of advanced organizers and summary reflections. Furthermore, the students’ individual cognitive levels are addressed in order to provide both easy and hard tasks.

Constructive applications of technology: Distance educations within a constructivist strand focus more on communication – both in asynchronous and synchronous mode. Technologies for communication (audio, text or visual) are consequently highly prioritized. Constructivism is the learning ideal (Garrison & Anderson, 2003) and students are expected to, individually and in groups, create
and re-create knowledge. Constructivism builds on the ontological assumption that meaning and knowledge are constructed and shared, and learning is seen as intertwined with personal and social action (Shoib et al., 2004). The role for educational technology is thus to support interaction, communication and negotiation, but also individual exploring. Discussion forums and chats supporting deliberations are important as well as access to many resources (e.g., via Internet and open access databases) for personal exploration.

In summary, both the behaviouristic and the cognitive views on learning have suited the computer hardware and automatization paradigm well (Cooper, 1993). They are both built on the notion of sequencing, and the input – output metaphor of computers reflects these ideals well. They also have in common that they are objectivist philosophies (Cooper, 1993; Shoib et al., 2004). Reality is seen as something that exists outside the learner and methods of learning are focused on how to get this reality into the students. Despite a strong start for behaviourism in computer learning applications, the idea that students’ minds are black boxes and the disregard of their internal thought processes have later been contested by many e-learning theorists (Garrison & Anderson, 2003; Laurillard, 2002; Rovai, 2004). These theorists abide to a more constructivist or socio-cultural strand, which regards students as active as opposed to passive receivers. Constructivism claims that there is no such thing as an objective reality. Reality is a personal interpretation which is constructed from experience and can be altered, or negotiated, through collaboration and interaction with others. Students are also seen as teachers ”as they bring diverse expertise, experiences, and worldviews to the task of learning” (Rovai, 2004, p. 79).

1.3.1 The Role of Technology

There are different views about the role of technology with a wide span between those who see technology as a causal agent that determines uses and impact society, and those who see technology as socially constructed where social choices shape technology (Kanuka, 2008; Orlikowski, 1992). If relating these philosophies of technology to e-learning, we would find researchers from a technological determinism viewpoint investigating the effects of educational technologies on learning, and researchers from a social determinism viewpoint studying how humans in a social context shape the educational technology. Others do not give technology a role at all by arguing that technology is neutral and that it is the educators, or the instructional designs, that affect learning – not the technology (Kanuka, 2008).
My view is that we cannot predetermine outcomes and that we therefore should not overemphasise the impact technology has on learning practices. There is no strict cause-effect relation where technology is the sole reason why certain learning practices emerge. Technology can facilitate certain practices, but the very same practices could just as well emerge in a classroom without technology depending on the teacher’s pedagogical stance. Furthermore, I have found many invented, sometimes unintended, uses of technology that would be better explained through the view on technology as socially constructed. Having said this, the students I have studied have not had complete control over the technology either. The notion of a duality, where the influence and shaping work both ways, thus best explains my research findings. My findings fit well within the idea of a “duality of technology” (Orlikowski, 1992), where technology in use involves a mutual shaping of technology and users.

1.4 ICT – a Facilitator for Pedagogical Change?

"You must unlearn what you have learned" (Yoda in Star Wars, Episode V: The Empire Strikes Back).

After the previous description of the technical and pedagogical phases of e-learning I will now focus on technology as a possible facilitator for change by sharpening the distinction between the kind of learning that e-learning is supposed to move away from and the kind of learning it is supposed to enable. I will do so by dichotomizing between traditional education and constructive learning. This dichotomization builds on descriptions where changes in the current education system are referred to as a change from a ‘traditional’ education system where the proposed change in learning culture is described as a ‘paradigm shift’:

- from traditional to progressive education (Dewey, 1916, 1938),
- from a “banking concept” to a libertarian, humanist education (Freire, 1970),
- from programmed instruction to learning webs (Illich, 1971),
- from behaviourism to constructivism (Cooper, 1993),
- from the “old education” to liberal education (Nussbaum, 1997),
- from a transmission model to a “conversational framework” (Laurillard, 2002),
- from traditional, non-reflexive, learning to reflexive learning (Morrow & Torres, 2002),
• from traditional to collaborative constructive learning (Garrison & Anderson, 2003),
• from traditional to “constructive learning environments” (Rovai, 2004).

Despite the common metaphor of a paradigm shift (as the above list shows) there is of course no unified notion of what we can call ‘traditional education’ or ‘traditional learning’. Neither is there a unified notion of what a ‘constructive e-learning structure’ is.

Criticism has been put forward that traditional education is rarely defined nor differentiated from any alternative learning approaches and to treat it as a homogenous practise is erroneous (Halperin, 2005). There is a huge diversity of ‘traditional educations’ and many have opposed the idea that “education operates something like a machine, and that each college is a slightly different version of the same ‘ideal’ machine” (Ehrmann, 1995, para 4). Even though I agree to this criticism, I have still made a dichotomization between the different educational structures in this thesis for analytical and illustrative reasons. What is described as ‘traditional’ education should not, however, be understood as a general or universal description.

Traditional education should neither be confused with behaviourism even if behaviouristic approaches have more often been used in what is here referred to as traditional education. Many studies have pointed to the usefulness of behaviouristic software (Cooper, 1993), and learning by memorizing is not always a bad practice if used as support to learning (I have learned French grammar and Bangla epithets that way). What is detrimental for education (and development) is if learning by memorizing becomes the dominant mode of learning on behalf of constructive learning:

“[T]he fundamental issue is not of new versus old education nor of progressive against traditional education but a question of what anything whatever must be to be worthy of the name education” (Dewey, 1938, p. 90).

Accounts of both these structures in my studies are based on previous research, as well as the informants’ descriptions of what they perceive are the characteristics of their education – past and present. These descriptions are often thus not generalizable beyond the very students in Bangladesh and Sri Lanka that took part in this study. In Table 1 (next page) I summarize the characteristics of the two learning paradigms.
<table>
<thead>
<tr>
<th>‘Traditional’ model</th>
<th>Constructive e-learning model</th>
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<tbody>
<tr>
<td><strong>Main learning philosophy:</strong> behaviourism</td>
<td><strong>Main learning philosophy:</strong> constructivism</td>
</tr>
<tr>
<td><strong>Characteristics:</strong></td>
<td><strong>Characteristics:</strong></td>
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<td>The traditional educational model is mainly enacted in a classroom where the teacher and students use tools such as blackboard, books, paper, pens and occasionally computers and beamers. These tools make content available through descriptions in books and through the teacher’s own interpretations (provided through lectures). The underlying norm is that the teacher is the one who should teach and that students should listen and learn. An underlying belief is that the students need a teacher in order to learn and that the teacher puts the knowledge into the students, i.e., knowledge is transmitted to students. Students reproduce knowledge. Key themes: Reality exists outside the learner; knowledge is objective; methods of learning are focused on how to get this reality into the students; quality in learning is achieved through the teacher’s design of the instruction and control of the learning environment; students are passive receivers; students’ previous experiences do not matter. Technology applications: ICT as a means for transmission of information; immediate responses and encouragement (e.g., application saying “you were right!” or stars falling on a correct answer); self-assessment tools; examinations (typically multiple-choice-questions).</td>
<td>The e-learning educational model is mainly enacted through technology. Tools used are computer, Learning Management System (LMS), mobile phone, television and radio. Content and interaction are made available through functions such as SMS, broadcasts and discussion forums. The underlying norm is that students should be highly autonomous and critical in their learning. This norm draws on an underlying belief that knowledge is created through engagement, dialogue and interactivity, i.e., knowledge is being constructed. Students are creating knowledge. Key themes: Reality is a personal interpretation constructed from experience and altered through interaction with others; knowledge is subjective; methods of learning are focused on creating a community of inquiry; quality in learning is achieved by interactivity, participation and dialogue; students are active, initiative-taking and self-regulating; previous learning experiences of students matter. Technology applications: ICT as a means for individual exploring (e.g., links, search engines, databases); synchronous and synchronous communication (e.g., discussion forums, chats, SMS, voice); simulations (hand-on-practice); creation of learning material (e.g., blogs, wikis and virtual worlds).</td>
</tr>
</tbody>
</table>
The traditional educational structure described here mainly builds on behaviouristic pedagogical ideals which also influenced the first applications of educational technology (Ally, 2008; Randall, 1981). Whereas it has long been argued that computer-based communication has fundamentally changed and transformed the way we communicate, technologies in education are said to mainly have been used for the enhancement of existing practices instead of using technologies possibilities to transform the ways we learn and teach (Garrison & Anderson, 2003; Ramsden, 2003; Selinger, 2009):

“Our essentially 19th century model of educational institutions does not scale up to the requirements of a 21st century society. Despite their potential to contribute to a rethink, digital technologies have usually been used in a technology-driven way to upgrade our existing educational models” (Laurillard, 2008, p. 521).

In opposing the use of technology to replicate poor learning methods it has been claimed that we should use technologies transformative powers to move away from a transmission-driven instruction to a learning ecology based on constructivism and learner-centeredness (Cooper, 1993; Garrison & Anderson, 2003; Rovai, 2004).

The major ideas at play in e-learning of learner-centeredness, individuality, interaction and contextualization stem from constructivism and are closely related to the ideas of Dewey (1916). Dewey pointed to two major principles for learning: continuity and interaction. Continuity refers to how our experiences affect all future experiences. Interaction refers to when these experiences (our personal meaning) interact with the present situation. Garrison and Anderson (2003) introduce what they call a “Transactional view” on e-learning where they build on the ideas of constructivism and collaboration but further points to the duality of the two:

“[A]n educational experience has a dual purpose. The first is to construct meaning (reconstruction of experience) from a personal perspective. The second is to refine and confirm this understanding collaboratively within a community of learners. [...] [C]loser consideration of the transaction reveals the inseparability of the teaching and learning roles and the importance of viewing the educational process as a unified transaction” (Garrison & Anderson, 2003, p. 13).
This interdependence in the learning process also calls for learners to take control and responsibility of the very learning process. For continuous, long term skills in learning, the taking responsibility of the learning is a prerequisite (Garrison & Anderson, 2003; Ramsden, 2003).

The constructivist view in e-learning thus requires that technology allows for the learner to be the generator of knowledge in cooperation with others. Discussion forums should stimulate discussions where the teacher only acts as a facilitator, or moderator, and practical applications of knowledge (e.g., speak English, create a database) should be a central part of technology use. Constructivism, in the sense of students being the active creators of knowledge, has good possibilities for realization in all forms of technical approaches referring to web 2.0 (or 3.0 or what comes next). Web 2.0 refers to applications where users, or students in this case, can create the very learning material themselves. E-learning 2.0 (or equivalent) refers to technology supported learning that allows the student to do more than just retrieve instructions and information. It enables students to share, shape and reshape information in user-created discussion forums, blogs, wikis and virtual worlds. These technologies are based on collaboration and social construction of knowledge where problems are solved in interaction (Brown & Adler, 2008; Downes, 2005; Wikipedia, 2009). Long before the Internet had made these webs possible Illich (another influential theorist on education) argued for a similar “network of learning objects” where students can cluster together in interest groups with peers of mutual interests (Illich, 1971, pp. 75 forward).

In order to get a grasp over all various concepts used in relation to constructivism, Figure 1 (next page) shows how these concepts are related.

In the papers underlying this thesis the concepts in Figure 1 have been used – sometimes interchangeably and sometimes as a distinct focus unit (such as when I was targeting interaction in one study). In the cover paper I use the concepts constructivism, constructivist learner and constructive learning practices unless I discuss one specific ingredient of constructivism (such as learning to learn) or if I am referring to or citing somebody else’s work.
1.5 Two Distance Education Programs in Bangladesh and Sri Lanka

The case studies I have used for exploring learning practices in relation to ICT use are situated in Bangladesh and Sri Lanka.

The study in Bangladesh concerns a project called Bangladesh Virtual Classroom (BVC). BVC started as a pilot study in 2005 where a methodology was developed to use mobile phones (mainly SMS) and TV to deliver distance courses to the learners. In conjunction with BVC a project called “Educate the Educator” was initiated in order to, just as the title suggests, educate the educators. The “Educate the Educator”- program was initiated based on the realisation that most teachers proposed for the project lacked pedagogical competence and knowledge of interactive teaching methods. By 2008 Bangladesh Open University (BOU) had started recording and transmitting the first lessons for a course in English including approximately 70,000 students all over Bangladesh, and in 2009 the full set of 29 lectures were aired again.
The BVC has been a collaborative project between various organisations including BOU, BRAC University, BU-IED (Institute of Educational development) and Daffodil University in Bangladesh, and – constant partner – Örebro University in Sweden. Initial funding was provided by the Swedish network SPIDER (Swedish Program for ICT in Developing Regions). The project started in 2005 and I have been part of the project since the start.

The case study in Sri Lanka concerns an Internet based e-learning program aiming at providing education to rural parts of Sri Lanka and to increase admissions to Information Technology (IT) educations. The program is the External Bachelor of Information Technology (eBIT) and is run by the University of Colombo School of Computing (UCSC). The program is accessed via a Learning Management System (LMS) and has admitted more than 20,000 students since the start4. The eBIT is a collaborative project between Stockholm University, Sweden; Delft University of Technology, Netherlands and University of Colombo, Sri Lanka. The main funding has come from the European Union and Sida (the Swedish development cooperation agency). I have been actively involved in the project since 2006, and I have also been provided with historical data and material from the project start in 2004.

Both these distance education programs have suffered from high drop out rates which has been ascribed to a lack of interaction and students being left all to themselves (Grönlund & Islam, 2008; Hewagamage, Samaranayake, Weerasinghe, & Gamage, 2005; Stockholm University, 2004). The introduction of technology was in both cases a response to these problems. In the Bangladesh case the purpose was to create an interactive learning environment (Grönlund & Islam, 2008). In the Sri Lankan case the purpose was to drastically increase the number of graduating students by facilitating “the paradigm shift from teaching to learning” (UCSC, 2004, p. 4) through “collaborative pedagogical methods” and the “effective use of e-learning” (Stockholm University, 2004, p. 2).

1.6 Research Aim

The overall purpose of this research has been to investigate if, and if so how, ICT use can contribute to development by improving the quality of distance educations in developing countries. ‘Improved quality’ here refers to educations that

4 As per spring 2010: http://www.bit.lk/index.php?option=com_content&task=category&sectionid=6&id=46&Itemid=82
foster and nurture constructive learners. The research question underlying this thesis is:

Can the use of ICT in distance education contribute to development, and if so, how?

This question was answered through two sub-questions:

I. Which are the major challenges for distance education in developing countries?

II. Can ICT be used in distance education to facilitate a change towards constructive learning practices, and if so, how?

These questions have been explored through six studies. The first three studies set out to answer the first research question about challenges for distance education. These three studies were explorative and mainly problem oriented by investigating challenges for e-learning:

Study I:
- What has existing research identified as the major challenges for e-learning?
- Is there a difference concerning challenges for e-learning between developing countries and developed countries?

Study II:
- Which are the major challenges for e-learning in a developing country context where the use of ICTs to deliver education is a new phenomenon and exposure to ICTs is low?

Study III:
- What do students in e-learning programs perceive as the major difference in learning behaviour if compared to traditional classroom teaching?
- Which are the major challenges they experience in relation to this difference?

The findings from these three studies guided me towards learning practices and the pedagogical aspects of e-learning. The three last studies focused more explicitly on the learning practices of students since this theme emerged as a result of the first studies. Students from both cases unanimously addressed the change in
learning practices to be a major challenge for them in studying in distance mode. These students had grown up in an educational setting based on the transmission-model where the belief was that the teacher is an expert and that students should listen and learn. Now, with the new e-learning agenda, and explicit aims to increase constructive practices, they were supposed to be highly autonomous in their learning. The guiding questions for the following studies concerned whether ICT can be used in distance education to support this pedagogical change and if constructive learning practices can emerge:

Study IV:
- How can technology be used in distance education in order to increase interactivity and thereby enable a change in the educational structure?

Study V:
- Does e-learning transform students into more independent, constructivist and collaborative learners?

Study VI:
- Can technology work as a catalyst for change in learning practices?
- If so, to what extent, and how, does re-structuration towards a constructive view of knowledge and learning take place?

1.6.1 The Reason to Focus on Practices

“Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing they are studying at the time” (Dewey, 1938, p. 48).

The reason why practices are studied is because of this research’s concern about development. Constructivism sees knowledge as being created and re-created and therefore constructive learning practices are focused on enabling students to learn how to learn. Development is about change, about questioning the current situation, about finding alternatives and deciding what kind of society we want to live in. This can only be achieved by way of empowerment through continuous knowledge creation, and learning to learn must therefore be essential for development (Selinger, 2009). The process of learning is in this sense more important than the subject content.

Another reason is that learning practices in connection with ICT use are rarely researched. Most studies concerning the value of technology in education are
comparative (Bullock and Ory, 2000) where e-learning replicates a traditional approach. Outcomes are measured in terms of grades, test scores or learner satisfaction where test scores and grades are measured based on “the re-statement of rote-learned facts and static information” (Garrison & Anderson, 2003, p. 19). These studies typically find that students perform just as well in e-learning mode as in a traditional classroom settings – something which is referred to as the ”no significant difference phenomenon” (Garrison & Anderson, 2003; Halperin 2005; Russell 2001). In this way many Information Systems researchers take an overly simplistic view on e-learning with too little focus on the learning process (Alavi & Leidner, 2001; Gupta & Bostrom, 2009). This research thus addresses this gap in knowledge by mainly focusing on learning practices and the way ICT is related to these practices.

1.7 Structure of the Cover Paper
The previous sections outlined the research aim and gave an introduction to ICT4D, e-learning and the two case studies used for this research. The next chapter describes my research approaches, including the case study design, the data collection and analysis. The section on data collection includes a specification of all tools used for data collection, number of visits and informants. The data analysis is discussed next, in particular in relation to how Structuration Theory has been linked to the analysis process. After this the case studies are more thoroughly introduced including descriptions of the available technologies and the educational context. The subsequent chapter concerns the theoretical foundations of this research and focuses on development theories and their relation to education and e-learning. Thereafter I move on to the result chapter which includes a brief summary of the results in each paper, a conclusion of all findings, contributions of the thesis and suggestions for future research. The credibility of the research is discussed in the end. The collection of six papers underlying this thesis follows directly after the cover paper.
This chapter gives a description of the research approach, followed by the research design including case study selection, data collection and analysis (with particular focus on the use of Structuration Theory).

In recognizing that bias and subjectivity are inherent in interpretive research I will throughout this chapter reflect upon my role and experiences in the field. The criteria of authenticity, plausibility and criticality (Golden-Biddle & Locke, 1993) have served as inspiration for these discussions.

2.1 Research Approach

The research in this thesis is qualitative and mainly interpretive, building on the ontological assumption that reality is socially constructed and produced by humans. Interpretive methods are “aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context” (Walsham, 1993, pp. 4–5). The interpretive approach is appropriate for this research because it shares the same ontological assumptions as Structuration Theory which I have used for my theoretical grounding. Giddens’s notion of a mutual shaping, or double hermeneutic, i.e., “we create society at the same time as we are created by it” (Giddens, 1984, p. 14), is by default interpretive. The interpretative approach is also appropriate due to the context sensitivity of case study research where the actions of humans in a certain context are under study.

I have complemented many of my findings with quantitative measures. For instance, I have used large surveys and questionnaires to investigate which issues
are seen as important by students in order to thereafter, during field visits, know which factors I should address in interviews and during observations.

My epistemological underpinnings are built on the awareness that all generated findings are the creation of both mine and the informants’ interpretations of what is happening (and why) in our attempts to understand the social world and our roles in it. These attempts to understand the social world have lead to a twisting and turning of all collected material from different angles. This twisting and turning can be seen if we follow the approaches used in all papers that constitute this thesis.

The first paper (A Conceptual Framework for e-Learning in Developing Countries) had an open approach to identify as many e-learning challenges as possible for the purpose of getting a first understanding of the field. This study was based on a broad and open literature study which yielded 30 different aspects to consider.

The second paper (Seven Major Challenges for e-Learning in Developing Countries) used these factors and compared them to all material from the Sri Lankan case study (e.g., questionnaires, interview transcripts, meeting notes, threads in discussion forums) in order to assess which factors were most commonly addressed in this particular case. This study used a large amount of informants and quantitative measures to count the number of times informants addressed a particular challenge. The study found seven major challenges (mainly related to learning) that were analyzed to see in which way they were important.

The third study (Letters from the Field) was the first to also include empirical material from the case study in Bangladesh. In order to see if the problems students perceived in e-learning were the same for the two cases an open approach was used by asking students about the major challenges they experience in studying at a distance. Students were asked to write answers to my questions as they were sitting in their classrooms at the learning centres. These written responses were very descriptive and gave me a good insight into the challenges they experienced. Again, I counted the frequency of topics addressed and discussed their meaning.

In the fourth paper (Increasing Interactivity in Distance Educations) the different learning styles in ‘traditional’ teaching and e-learning were discussed and analyzed for the first time using Structuration Theory. This paper used both case studies and the material for analysis was structured according to different phases based on technology changes. The study took a retrospective approach by
reconstructing changes to the technology, as well as rules and ideas concerning learning. Here I used a lot of written documentation (e.g., rulebooks, study guides, technical documentation) but also material from participatory observations and interviews.

The fifth paper (Learning e-Learning) focused on students’ underlying beliefs about learning by analyzing students’ reasons for requiring a certain support function. Lack of support was in the second study found to be the top challenge for the Sri Lankan students and in order to define support needs the study used a literature study on support as a base for categorizing support functions. The informants were divided into two groups based on them being beginners or experienced and fourteen support functions were mapped against the empirical findings. Quantitative measures were thus used to identify the most important support functions and thereafter a structurational interpretation was made to find why these support functions were seen as most important for their learning.

In the sixth, and final, paper (Learning from e-Learning) I selected a smaller amount of students that were observed in using technology and interviewed about their beliefs and ideas on how they learn. This study was the most qualitative and ‘close’ study of them all. This study also built on Structuration Theory and had a Structuration Theory design all the way through – from design, to data collection and analysis.

2.2 Research Design

I have relied on several literature studies and two case studies for this research and the two approaches will be further described below. The literature studies have been conducted (and up-dated) on a continuous basis, whereas the case studies have had more clear time-lines. I was actively taking part in the eBIT project from fall 2006 and withdrew from it in spring 2009. I have been active intermittently in the BVC project since its start in fall 2005 and to its end in December 2009. Despite the fact that I have been involved in the BVC project for a longer time, and that it has been administered from my home institution, the eBIT project is by far and large my major case. The BVC project has not but recently been in operation for students and I have therefore had much better opportunity to collect data from eBIT.

Figure 2 (next page) overviews in summary the research process with a focus on how findings from one study fed into the next research question. Dotted boxes refer to discoveries and ideas that were relevant for the progress of the research, but were not part of the initial research design.
Figure 2. Summary of the research process

1. Literature study: Theories of development
   - Research Question 1: What are the major challenges for e-learning?
     - Literature review
     - Finding: A framework of many interrelated challenges.
     - Research Question 2: Which are the major challenges in a developing country context?
     - Case study eBIT
   - Literature study: Structuration Theory
     - Finding: Knowing how to learn is the major challenge - the pedagogical change.
     - Case study eBIT
     - Case study BVC
   - Constructive ambitions in both project description and teachers' handbook

2. Literature study: E-learning and pedagogy
   - Research Question 3: What is the problem in learning?
     - Case study eBIT
     - Finding: Seven challenges mainly related to learning.
     - Research Question 4: How can technology be used to increase interactivity and enable a structural change?
     - Case study eBIT
     - Case study BVC
   - Constructive ambitions in project description

3. Constructivism is related to development.
   - Literature study: Theories of development
     - Research Question 5: Does e-learning transform students into more constructive learners?
       - Case study eBIT
     - Finding: The longer students stay in e-learning the more they think and act in terms of constructivist learning.
     - Research Question 6: Can technology work as a catalyst for change towards constructivist learning practices? How?
       - Finding: Use of technology facilitates constructivist learning practices through individual exploring and interaction with teachers and peers.
       - Case study eBIT
2.3 Literature Studies

Much reading underlies this thesis, some of which is accounted for and some that is not. At least five strict literature studies have been conducted: one on e-learning challenges, one on support needs in e-learning, one on Structuration Theory, one on development, and one on e-learning pedagogies. They have all started off differently: sometimes as part of a PhD-course, sometimes in conjunction with a research project, and sometimes due to sheer interest and curiosity. Except for the literature study on support needs (paper V – Learning e-Learning) they have all started with very few exclusion criteria and with two main search engines for the searches. The first was the Örebro University’s academic search engine Elin@örebro which covers fourteen academic databases and several thousands journals related to our field. The second was Google Scholar (http://scholar.google.com/).

Based on relevant search terms the papers and books found were initially selected based on title and abstract. Some books and papers were excluded due to them being highly commercial, too biased, or of too low quality. Due to the magnitude of papers and books related to my topics and due to my curiosity in each read paper or book the so called “snowball method” (Greenhalgh & Peacock, 2005) was often used (i.e., looking into the reference list for further reading). Saturation was used as the stop criterion – I stopped when I felt that I was finished and when no more interesting angles to the topic came up.

A limitation in relation to finding literature has been to find reliable and valid sources in conjunction with the Bangladesh case. Information about e.g., number of students enrolled at BOU has varied between different sources (figures vary in official reports from BOU and the statistics given on their website, and between direct responses from the Vice Chancellor, teachers and the registrar at BOU). The information on how many students are annually enrolled in the particular English course that I have followed is therefore not certain, but I have used the estimate that project management has made.

Finding reliable and valid sources of information on the educational historical context in Bangladesh also turned out to be a challenge. I have used sources such as various encyclopaedias, official government websites (including Bangladesh Bureau of Educational Information and Statistics) but every time I have had the description proof-read by any of my friends and colleagues from Bangladesh they

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5 For example, ABI/Inform, Blackwell Synergy, Ebsco, Emerald, Sage, ScienceDirect, SpringerLink and Wiley.
have pointed to factual errors. For this reason caution has been taken in these
descriptions and facts and figures are only used where they have been verified by
all consulted colleagues from Bangladesh.

This makes the data about the context of Bangladesh less certain. Having said
this, the main focus of this research – the students, their ICT use, and how they
think about learning – is not affected by this limitation.

2.4 Case Study Research

This thesis has an empirical focus and is based on two case studies. Case studies
allow for the ‘how’ and ‘why’ questions and examine “a phenomenon in a natu-
ral setting, employing multiple methods of data collection to gather information
from one or a few entities (people, groups, or organizations)” (Benbasat, Gold-
stein, & Mead, 1987, p. 370). Case studies are typically also employed where the
“boundaries of the phenomenon are not clearly evident at the outset of the re-
search and no experimental control or manipulation is used” (Benbasat et al.,
1987, p. 370). My case studies have included a variety of data collection methods
such as questionnaires, participant observation, document review, and semi struc-
tured interviews. The research has taken place at site in the countries during six
visits, but also from afar mainly using Skype and e-mail for communication.

The fact that the boundaries are not set from the start makes case studies open
for flexibility. It is possible, and even advisable, to add questions during an inter-
view and it is reasonable to change or add data collection methods during a study
in order to get as much depth as possible:

“Thus, if a new data collection opportunity arises or if a new line of
thinking emerges during the research, it makes sense to take advantage
by altering data collection, if such an alteration is likely to better ground
the theory or to provide new theoretical insight” (Eisenhardt, 1989, p.
539).

During this research this was also often the case. Some interviews have taken
place in cars or at coffee breaks as opportunities arose, and students writing writ-
ten responses to my questions came up as an ‘emergency’-option when students
were too shy to talk. During most interviews, questions have also been added, or
altered, based on the informant’s story. This possibility to alter the data collection
is not, however, a license to be unsystematic. Instead, “this flexibility is controlled
opportunism in which researchers take advantage of the uniqueness of a specific
case and the emergence of new themes to improve resultant theory” (Eisenhardt, 1989, p. 539).

Case study research is also said to be appropriate when dealing with practice-based problems where both the actors’ experiences and the context of action are crucial (Benbasat et al., 1987; Bonoma, 1983). This research deals a lot with “practice-based problems” since students’ interactions with different information systems are under study, and the “actors experiences” – both previous and present – are central to all my questioning. I have been looking at these issues in relation to a special “context of action” (i.e., using technology while taking a distance course).

2.5 My Case Study Method – Choices and Reasons

To give a self-revealing and self-reflexive account is especially important in those instances where the researcher “acts as his/her own research instrument” (Schultze, 2000, p. 7). I will therefore start the description of my empirical research by discussing my motives for conducting this research, as well as my role and choices in relation to the cases.

2.5.1 Personal Motivation

The reasons for my interest in this area are two-fold. The first, and most important, is political or moral if you like. I think that it is wrong that people and countries most in need do not benefit from ICT use and I want to contribute to a change.

Since my research is interpretative it may not immediately strike anyone as contributing to a change, but I believe that a better understanding of how ICT can support learning practices conducive to development can inform both researchers and practitioners about what change measures to take. As an Information Systems researcher I want to explore ICT’s possibilities of improving the living conditions of our world’s majority of poor instead of improving the lives of our world’s minority of rich. This thesis thus started with personal motivation and with a critical point of departure saying that it is wrong that there is an inequality in people’s possibilities to use ICT and get educated, and a desire to change this. The research thus has a basic underlying critical stance and started out focusing more on “what is wrong with the world rather than what is right” (Walsham, 2005, p. 112). The thesis therefore also strives to have a practical relevance where problems identified are analyzed and where suggestions on how to eliminate, or diminish, these problems are discussed.
The underlying perspective is thus critical and a critical perspective recognizes that people’s abilities to change their economic and social circumstances are constrained by social, cultural and political domination. It is also, as Walsham (2005) points out, a starting point and an attitude when starting a research project; i.e., you believe that something is wrong and you want to change it. Having said this, the research approach in this thesis does not contain any explicit critical research method (typically action research) but is critical in the way it seeks to be emancipatory and wants to contribute to the elimination of the causes of alienation. The main theoretical tool used in this thesis is Structuration Theory which has often been used by critical researchers as way to “not only examine processes of interpretation on the part of human subjects, but also to consider wider systems of power relations and norms within which they are located” (Walsham, 2005, p. 114).^6^6

The second reason for my interest in this research area is due to my other profession as a teacher. I have worked as a teacher for over ten years and have always been interested in how and why students learn. I found my research topic to well allow for a deeper exploration in this field and my research findings have fed into many ideas for me as a teacher. In criticizing the constraining features of transmission-driven educational structures I have become painfully aware of my own short-comings as a teacher. My research endeavours have in this way contributed to my personal growth as a teacher and made me encourage, and use, more constructive learning practices in my teaching.

2.5.2 Selection of Cases

My underlying concern about improving the living conditions of our world’s majority of poor made me decide to do research in developing countries. My interest in ICT combined with my prior experience of teaching made me chose e-learning cases.

The first case in Bangladesh came as an opportunity for me when my department together with a counterpart in Bangladesh initiated the BVC project. After my first visit to Bangladesh I had decided to pursue the topic and was actively

[^6]: Still, it is important to distinguish between an underlying critical perspective and what is known as critical theory. Whereas critical researchers acknowledge that social reality is produced and reproduced by people (Myers and Avison 2002) they tend to have a strong focus on the constraining aspects of structures. Structuration Theory, on the other hand, makes a fundamental point of the interdependency between structures and agency and thus has an equal focus on the enabling features of structures.
looking for a similar case. I soon heard about eBIT in Sri Lanka, which was partly administered from Stockholm University. Within only days of contacting eBIT project management I was welcomed to conduct my research.

The two cases were primarily selected because they concerned e-learning projects where technologies were given central roles as catalysts for change towards a constructive learning culture. Also, important practical advantages were considered since I had good access to material in the cases. The two cases are similar in regards to:

- **Region:** Both cases are located in countries in South Asia and are categorized as developing countries (IMF, 2009), with a medium level of human development (UNDP, 2009). In economic terms Bangladesh is categorized as a low income country and Sri Lanka as a lower middle income country (World Bank, 2009b).
- **Educational context:** Both cases concern undergraduate distance educations with large student populations.
- **Problem:** Both cases have suffered from high drop out rates and both cases are set in transmission-based educational cultures.
- **Aim and scope of intervention:** In both cases projects have been initiated in order to increase pass rates and improve the education by using technology to increase constructive learning practices.

The two cases, however, differ in relation to the technology used. In the Bangladesh case project management chose to use TV (video recordings) and mobile phones whereas the Sri Lankan management chose computers and a web based LMS.

### 2.5.3 My Role in the Cases

My role in the cases has varied. In the Bangladesh case my role has been that of a researcher but also, in part, that of an evaluator to the funding agency. In the Sri Lankan case my roles have been the same but with the extension that I, at times, also have been engaged as an ‘e-learning expert’ (the project manager’s label, not mine) and teacher.

The role that may have affected this research negatively is the one as an evaluator. There is always the risk that people will put make-up on the project in order to keep sponsors happy. For this reason I have declined offers about co-authoring papers on the projects that I have suspected to become too uncritical and selling.
Having said this, my part of the evaluations has been minor and considering my multiple information sources I believe that most cracks in the make-up have been revealed. Of greatest importance is that I have never evaluated, nor acted as an evaluator, in relation to my major groups of informants – the students.

A concern in relation to students, however, could be that they are biased in the sense that they want to please me and think that I want them to report changes in learning behaviour or the merits of e-learning (as was addressed in paper VI). This is always a risk, but since I early during my investigations became aware of this possible bias I was always very sensitive to it. I always encouraged my informants to be open and honest and consistently said that there are no right or wrong answers. I also have a very friendly and non-prestigious tone when interviewing which made it possible to say things such as “come on, you do not have to say you love e-learning, I don’t care if you hate it and I won’t tell anyone!” The students often laughed when I said this and I kept my promise in not telling anyone. This brings me to the other preventive action I took in avoiding biased students – which was keeping ‘wolves’ out. I have asked many teachers (and in some cases project management) to leave the room where I have interviewed students. I have ensured students their anonymity and that what they say stays with me. In the cases where students wrote answers to my questions on pieces of paper I ensured them that I would stay in the room to collect them and that I would not show them to the teacher or anyone else who could identify them.

Another call for concern is the lack of closeness I have had to my cases due to geographical and social distances. I have worked closely with, and thereby become close and friendly with, most of my informants related to project management and staff, but with the students my role has been that of an ‘outside observer’ (Walsham, 1995). Because I have only been able to conduct shorter visits to my case-countries (two weeks at a time) I have of course missed many complexities and issues related to my cases.

Being an ‘outsider’ does however have its value – “there are occasions where ‘outsiders’ can also contribute very valuable new insights into research understanding from their external perspectives” (Unwin, 2006, p. 3). In my case it was most evident in the Sri Lankan case where my desk-top monitoring of all project documentation and close reading of the students discussion-forum (simply because I could not be at site!) led to findings the staff at place had not considered. Notwithstanding the fact that I most probably would have gotten a deeper understanding of the context if it had been practically possible for me to stay longer periods of time in the countries, I believe that what I lost in closeness was also
gained by a “critical distance” that hindered me from getting uncritically absorbed in the projects and the local conditions (van den Akker, 1999). As Unwin writes on the topic: “doing research ‘at home’ is no better or worse than doing research overseas” (Unwin, 2006, p. 1). I have done a little bit of both.

2.5.4 Selection of Informants

Informants have been selected based on their different roles and in relation to the different research questions. Students have been the primary informants in most cases, but teachers, content developers and project team members have also been consulted. The decision on which students and teachers to select has often been based on “convenience sampling” (Oates, 2008). Many informants have been selected because of their availability during the field visits (i.e., courses running or learning centres open during my stay), whereas content developers and project members involved in the programs have been more continuously available. A categorization of the different informant groups is described as below:

Students

Students in the Bangladesh case refer to either students from the private university BRAC\(^7\) (only observations) or to students studying English at BOU. The English-studying students at BOU were present during the recordings of the BVC lessons or taking classes at a learning centre during 2008. Another seven students that had followed the course in fully distance mode were interviewed in 2009.

Students in Sri Lanka refer to students admitted to the eBIT program at various levels of the program (i.e., at different levels of progress) between year 2004 and 2008. Informants for year 2004 and 2005 were selected by the UCSC staff and the later years’ informants were selected by me. The informants I selected in Sri Lanka have often been selected based on geographical proximity due to the civil war situation in the country where it was not advised to leave Colombo (the largest city and commercial capital of Sri Lanka).

Teachers

In Bangladesh the teachers refer to the BRAC teachers attending the Educate the Educator workshops during spring 2006 and the teachers recording the lessons

\(^7\) The university was established in 2001 by BRAC which is one of the largest NGO’s in the world. The mission of BRAC University is to “foster the national development process through the creation of a centre of excellence in higher education that is responsive to society’s needs” (Source: http://www.bracuniversity.net/about/)
for the BVC during 2008 at BOU. In Sri Lanka the teachers refer to facilitators at the different learning centres that I visited during three trips in 2007–2008.

Content Developers
In Bangladesh the BOU teachers are also course designers that record the lessons for the BVC and thus have double roles as teachers and script writers. In Sri Lanka the content developers are responsible for creating learning objects to be used in the eBIT program. They take instructions from subject matter experts and instructional designers and are then set with the task to physically implement their ideas.

Project Team Members
In Bangladesh the project team members that were used as informants were the initiators and project managers themselves. In Sri Lanka, project team members refer to all staff (except content developers) working at the e-learning centre, e.g., board members, administrators, directors.

2.6 Data Collection
Most empirical material used for this thesis has been collected during six field visits (three to Bangladesh and three to Sri Lanka) each lasting around two weeks. As is typical for the case study research, several methods for data collection have been used in order to validate the findings (Patton, 1990; Yin, 1994).

All questionnaires have been distributed face-to-face at place in Sri Lanka and Bangladesh, except for two online questionnaires in the Sri Lankan case. The interviews and observations in Sri Lanka took place in May 2007, April 2008 and December 2008 during visits to Colombo. In Bangladesh the first observations and interviews took place at BRAC in 2005. The second round of observations and interviews took place at BOU and at a learning centre in January 2008. Finally, interviews with seven students at BOU headquarters took place in August 2009.

In order to get in touch with many students I have targeted learning centres where most students meet once a week. A majority of students from both cases study in mixed mode style by studying at a distance during the weeks and going to learning centres once a week (for lectures or Internet access).

8 The e-Learning centre at UCSC is a national centre dedicated to promoting e-Learning in all sectors of education in Sri Lanka. This e-Learning centre has developed all e-learning material for eBIT.
In Bangladesh two different learning centres were visited based on project management’s suggestion. In Sri Lanka I arranged my visits on my own and the plan was to visit the four learning centres located in Colombo at two different times. As it turned out three re-visits were made since one learning centre had closed down by the time of my second visit.

Table 2 and 3 below shows which empirical material has been used for the research.

**Table 2: Data capture points Sri Lanka**

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Source/informants (n)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document review</td>
<td>Student guides (7), funding applications (2), project report (1)</td>
<td>2000–2009</td>
</tr>
<tr>
<td>Questionnaires</td>
<td>Students (1775), staff (34), teachers (8)</td>
<td>2004–2008</td>
</tr>
<tr>
<td>Semi-structured interviews</td>
<td>Students (81 written responses, 24 oral and transcribed responses), teachers (11),</td>
<td>2007, 2008</td>
</tr>
<tr>
<td></td>
<td>project management (5), content developers (9)</td>
<td></td>
</tr>
<tr>
<td>Participant observations</td>
<td>Learning centres (7 occasions each including 1–2 teachers and between 14–50 students), content developers (8 different content developers at 8 different times), board meeting (1 occasion with 8 participants), meeting with representatives of Sri Lanka’s IT industry (one occasion with 11 participants), staff meetings (3 occasions with 3–15 participants), project meetings (11 occasions with 2–6 participants), student discussion forum (64 students over a period of 3 months)</td>
<td>2006, 2007, 2008</td>
</tr>
<tr>
<td>Technical demonstration of functionality of eBIT Moodle</td>
<td>Content developers (2)</td>
<td>2009</td>
</tr>
</tbody>
</table>
### Table 3: Data capture points Bangladesh

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Source/informants (n)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires</td>
<td>Teachers/content developers (36), students (9), project manager (1)</td>
<td>2005–2008</td>
</tr>
<tr>
<td>Semi-structured interviews</td>
<td>Student (41 written responses, 8 oral and transcribed responses), teachers (4), project manager (1)</td>
<td>2005, 2008, 2009</td>
</tr>
<tr>
<td>Participant observations</td>
<td>Learning centres (2 occasions with 24 and 56 students respectively), regular campus class (1 occasion with 31 students), recordings at BOU (7 sessions each including 1 teacher, 1 technician, the project manager and between 9–12 students), project meetings (5 occasions with 3–6 participants)</td>
<td>2005, 2008, 2009</td>
</tr>
<tr>
<td>Observation of the BVC system (technical demonstration and review of all documentation)</td>
<td>Software developer/programmer (1)</td>
<td>2009</td>
</tr>
</tbody>
</table>

In summation: Ten observations of well over 100 individual students have been made at six different learning centres. Content developers have been observed at fifteen different times. Two technical demonstrations of the systems and their functions were made. 12 questionnaires have been distributed (six to students, four to teachers, one to content developers and one to management). 146 students, 15 teachers and five persons from management were interviewed. Further information was retrieved through documents and numerous meetings. All in all this makes the study based on almost two thousand students and over one hundred teachers’ and staff’s opinions.

I am responsible for all data collections with two exceptions: the first three questionnaires in Sri Lanka (from 2004 and 2005) were constructed by the staff at the e-learning centre. Furthermore, the study in Bangladesh in 2008 was mutually designed with a colleague of mine who also assisted me in the collection of the data.
**Questionnaires:** The two eBIT student questionnaires from 2004 and 2005 were designed by project management and concerned students’ previous academic qualifications and experiences of ICT use, as well as needs and opinions related to eBIT. The eBIT staff questionnaire was designed to get information about the staff’s previous experiences of ICT and e-learning, their training needs for the future, as well as their attitudes and expectations.

The questionnaires I have developed for eBIT students and facilitators were based on the framework of challenges that I developed in the first study. Questionnaires in relation to the study on interactivity (both eBIT and BVC) were used to survey feelings and motives related to creating and/or using interactive functions of the systems.

In the BVC case two questionnaires were also made with BRAC teachers that participated in the Educate the Educator workshops. These questionnaires aimed at capturing the teachers’ views on their roles as teachers and teaching methods in general. These questionnaires were given with a five-month interval to estimate if the level of interaction in the classroom and the teachers’ teaching techniques changed.

All questionnaires have been designed with a mix of open and closed questions (ranked and non-ranked).

**Interviews:** The approach for the interviews was to use a general interview guide (Patton, 1990) which contained a pre-defined set of issues to be addressed in any order as the conversation moved on. This made the interviews open-ended to their nature, giving the informant the role of someone informing the researcher and free to shift the conversation to what s/he thought was important by coming up with own suggestions and ideas. At the same time it allowed me to be focused and tick off topics as they fitted into my guides. This open approach was mainly chosen because of my interpretative stance, but also because the interviews were not conducted in the native tongue – neither by me nor by the interviewees. I feared that by using pre-defined concepts I would ask leading questions and get my own phrasing back in the answers. So I needed the space to reformulate and elaborate most of my questions.

Interviews were sometimes conducted with one informant at a time and sometimes in groups. Typical interviews ranged between 30 and 60 minutes. All interviews have been recorded and transcribed.

During some interviews the students wrote down their answers on paper instead of talking directly to me (these are the ‘letters’ I refer to in paper II, III and IV).
The idea for these written responses emerged as an emergency option when not being able to get students to talk or volunteer for individual interviews during my first visit to Sri Lanka in 2007. I was visiting a learning centre and was asking for volunteers for interviews, but when no one raised their hands, and when their teacher started insulting the students for their lack of ‘courage’, I gave up and simply asked the students if they could write down the answers to my major questions instead. They all did, and since I found these responses to be very honest and descriptive I re-did the procedure in Bangladesh. In the Sri Lankan case the responses were written in English, but in the Bangladesh case they were written in Bangla and later translated into English.

**Participant observations** of students have taken place at learning centres and have aimed at capturing what students do with the technologies at hand and also what they do during lectures. Content developers were observed while using the technology at UCSC and BOU. All observations have been documented in field notes.

**2.7 Limitations**

Interpretations are by nature subjective which sometimes makes people question the credibility of interpretative research. Notwithstanding the fact that other researchers could interpret my material in another way, my interpretations are not subjective in the way that they only belong to me. I have used multiple sources for validating my interpretations so I have not come up with my interpretations in isolation. Students’ claims have been double-checked with teachers and project team members. Observations of actions have also been used to confirm, or dispute, both what students say as well as my own interpretations. When relevant, I have also been able to use official documents such as student guides and rulebooks to get claims validated or a deeper understanding.

During interviews – with students as well as with project team members and teachers – interpretations were also shared between me and the informants. In my efforts to know exactly what my informants felt and meant I used a lot of probing questions. Almost every answer has been followed by a “how?” or “why?” or “what do you mean?”, and when I thought I had understood I usually asked summing up questions such as “so do I understand you correctly when you say...”. Interestingly enough, much of this probing came naturally due to our language barrier (English is not mother tongue of either me or my informants). The fact that my informants often had to ask me to repeat my questions, and because I had to admit to not always understanding their answers, we spontaneously fell into a discussion mode where we had to repeat and confirm what we
were discussing. In this way we negotiated our way through to a shared interpretation and a shared understanding.

For a further discussion on challenges in interpretive research see Section 6.2 “Credibility Concerns Related to Case Study Research”.

2.8 Data Analysis

The material that has been analyzed in this thesis varies and consequently also the analysis methods. I have conducted quantitative and qualitative analyses with different aims and designs. Three major approaches have been used – assessing importance, analysis of meaning, and structurational analysis. They will all be described below.

The quantitative analyses were used in order to assess something’s worth and importance by counting on how many persons refer to something. This was done in order to identify which e-learning factors were seen as most important by students in Sri Lanka (paper II – Seven Major Challenges for e-Learning in Developing Countries), which the major challenge was when studying in distance mode (paper III – Letters from the Field) and which support needs were most frequently asked for by novice and experienced students respectively (paper V – Learning e-Learning). These analyses have been time-consuming given the diverseness and large volumes of empirical material, but otherwise rather straightforward.

The general approach has been to summarize pre-defined questions in the questionnaires in percentage numbers where the number of informants has exceeded 100 and in the other cases more caution has been taken by instead illustrating the outcome with exact numbers (e.g., 7 out of 8 teachers said that language was the biggest problem for the students). In cases where scale based qualitative measures (ordinal data) have been used the median has been calculated and used as measure. All open answers (from questionnaires and interviews) that have been used for quantitative measures have been analyzed by counting the occurrence of different topics (e.g., in 122 written answers ‘knowing how to learn’ has been mentioned 80 times by 75 unique students). These kinds of calculations were much helped by using functions such as ‘count of codes’ in the computer based tool for qualitative analysis that I used (Atlas.ti). From all these various ways of counting, pictures emerged where some topics could be said to be more often addressed or said to be most important by students.
Analysis of meaning has been used for the literature studies and also in conjunction with the quantitative measures of empirical material. During a literature study, for example the one on e-learning challenges, I identified numerous papers stating that factors such as flexibility and motivation are important, but in order to understand why they are important I needed to analyze their meaning. This was done by using quotations or longer descriptions from the texts and by inserting them into a database where they were labelled according to their meaning. For instance, ‘flexibility’ would here get four different meanings where it could relate to flexibility in pace, place, time and course topics. The same was done for the empirical material where statements such as “I have problems with time”, when reading the full context, could be due to the student either not spending time on the course due to other obligations or the course content being too heavy. In this way meaning was given to the factors addressed and different nuances to the same factor could be revealed.

The structurational analysis started with paper four of this thesis and builds on Structuration Theory, which is described in the following pages.

2.9 Structuration Theory

Structuration Theory has been used for analyzing and explaining the research findings from my two case studies. The main theoretical tool used is that of “technology-in-practice” as developed by Orlikowski (1992, 2000) and further expanded by Halperin (Halperin, 2005; Halperin & Backhouse, 2007). I will, however, first start by providing an overview over Giddens’s original Structuration Theory (Giddens, 1984), followed by a description of how Structuration Theory has been used in the Information Systems field. Thereafter I will narrow the description to how I have used Structuration Theory in this thesis by focusing on the extensions to Structuration Theory made by Orlikowski and Halperin. Finally I will end this section by giving my reasons for using Structuration Theory in my studies.

In order to understand Giddens’s Structuration Theory we have to take a start in a central question for sociology – what constitutes society? Sociology deals with society and social action (how society is organised and how society is made possible) and explanations and theories have been plentiful. A classic polarisation in sociological theories has been that of those primarily focused on structure and those primarily focused on agency for explaining social behaviour. Structuralist sociologists see human agency as subdued to structural forces whereas those
focusing on human agency think that the actor is the creator, or interpreter, of 
social life. What Giddens proposes is a description of the nature of human action 
and social organisation where social life is more than the aggregation of random 
individual acts, but not only determined by social forces. An initial ambition with 
Giddens’s Structuration Theory (Giddens, 1984) was thus to challenge this di-
chotomisation historically made in social sciences between the subjective (indi-
vidual - micro) and objective (society - macro). He did this by pointing out that 
”[t]he basic domain of study of the social sciences, according to the theory of 
structuration, is neither the experience of the individual actor, nor the existence 
of any form of societal totality, but social practices ordered across space and 
time” (Giddens, 1984, p. 2).

This means that human agency (the ‘capacity to make a difference’) and social 
structure are interdependent and intimately related and cannot be understood in 
isolation. This, in turn, requires any effort to study social life to take both human 
action and social structure into account. This interdependency is what Giddens 
refers to as the “duality of structure” (Giddens, 1984, p. 25). The duality of 
structure means that structures are not only constraints that shape what we do, 
but rather it is our actions, or practices, that constitute these structures. Thereby 
structures are also enabling in a sense that we act through these structures:

“Human social actives, like some self-reproducing items in nature, are re-
cursive. That is to say, they are not brought into being by social actors 
but continually recreated by them via the very means whereby they ex-
press themselves as actors. In and trough their activities agents reproduce 
the conditions that make these activities possible” (Giddens, 1984, p. 2).

Structure is therefore a prerequisite for action. We need all these rules and rou-
tines to make sense of what we are doing and structures thereby enable us to plan 
future action and changes by “reflecting on the extent to which desired outcomes 
are achieved” (Stubbs, Martin, & Endlar, 2006). Without structures we simply 
have nothing to reflect upon. So human agency also gives us the ability to change 
the very structures we act in – by ignoring them, replacing them or, to use Gid-
dens’s terminology, reproducing them differently.

A structure consists of rules and resources where the rules can be said to be im-
licit formulas for action (even if sometimes only in our heads) and the resources 
are what people bring into the action (abilities, knowledge, etc.).
The definition of a structure that Giddens gives is that it consists of “[r]ules and resources, recursively implicated in the reproduction of social systems. Structure exists only as memory traces, the organic basis of human knowledgeability, and as instantiated in action” (Giddens, 1984, p. 377).

The notion of structures only existing as memory traces simply means that it is all in our heads (individually and/or collectively) and that what is in our heads (rules, ‘shoulds’, resources, abilities) is what we bring into the action of everyday life. We are shaped by the structures in our heads, and these structures are reinforced by us routinely following, or enacting, them. At the same time it is our daily actions and routines that shape the very structures in our heads. So by routinely following the structure we reinforce it and by not routinely following the structure we change it. It can be because the rules do not apply in a new context or because there are other strong competing structures. This change is rarely dramatic, but most often takes place when small nuances of changes occur in a structure that therefore stops existing as a solid structure. What makes a structure solid is if it is repetitively acted across space and time. This, again, makes the structure activity-dependent, which brings us to the discussion of human agency: what do the agents do? What are they capable of doing?

Giddens explains human agency by using a ”model of stratification” (Giddens, 1984, p. 5 ff) where he describes agents’ actions on three layers: motivation – why you want to do something (even though these motives may be unconscious); rationalization – reasons you give for why you do something, and; reflexive monitoring – your knowledge of what you are doing. Central here is the ”reflexive monitoring of action” which means that the agents continuously monitor, or reflect over, what they are doing. Giddens’s model also includes a time aspect where agents when acting do not always know what is going to happen. There are unacknowledged conditions of actions and there is also room in the model for unintended consequences of action which, when reflected upon, could lead to changes, sometimes improvements, of earlier actions.

Humans are in this way fundamentally seen as knowledgeable and capable. By capable Giddens means that the person could have acted otherwise (i.e., have a choice) and by knowledgeable he means that people, through the reflective monitoring of actions, know “a great deal about the conditions and consequences of what they do in their day-to-day lives” (Giddens, 1981, p. 281). Capability means that people have the power to make a difference. This may sound cynical to researchers in developing countries, seeing such strong constraints on people’s abilities to make a difference, and the duality between agency and structure does of
course have its limitations. But the capability to make a difference is intended to be understood on a more philosophical level, meaning that in principal even the most insignificant person on our earth has some capacity to make a difference. Giddens is not claiming that people have total freedom, but rather that it is possible to understand how people are influenced by different factors without ignoring the fact that they do have some ability to chose their actions in certain circumstances (Johansson, 1995).

In this way Structuration Theory is also a theory of hope, because having the ability to make a difference also implies some power. Power, according to Giddens, is exerted through resources and he defines two kinds of resources: allocative and authoritative. Allocative resources refer to domination of material things (or the ‘natural world’) whereas authoritative resources refer to the co-ordination of human activity (Giddens, 1984, p. 31). ICT can in this way be regarded as both an allocative resource (being an artefact) and an authoritative resource since it organises people’s actions. I will elaborate more about the role of technology further below.

On an analytical level Giddens identifies three major dimensions of structure; signification, domination and legitimation; and three corresponding dimensions of agency; communication, power and sanction. Signification is about meaning; domination is related to power through control of resources; and legitimation refers to moral orders such as norms, rules or standards. Figure 3 shows how this complex relation between agency and structure is inter-linked through modalities referred to as interpretive schemes, facilities and norms (Giddens, 1984). These dimensions are inherently entwined and the separation between them is only for analytical reasons:

![Figure 3: The dimensions of the duality of structure (Giddens, 1984, p. 29)](image-url)
These three dimensions are thus acted on by human beings (interaction) and expressed through different modalities (ways of communication) and these dimensions interact and enforce each other. It is thus here, in the modalities, that the interaction between actors and structure takes place, this is where the duality of structure is inter-linked and made visible, and that is why I have focused on them in my empirical analyses. But before we go into details about these modalities and how I have used them we will look at how Structuration Theory has been applied in the Information Systems field.

2.9.1 Structuration Theory in Information Systems Research

Despite the fact that Giddens does not address the issue of technology in Structuration Theory, and that he generally seems very uninterested in the Information Systems field (Jones, 1999), his theory has been frequently used in our field (Jones, Orlikowski, & Munir, 2004; Pozzebon & Pinsonneault, 2001; Rose, 1998). A count of published articles between 1983 and 2004 yielded as many as 331 Information Systems articles drawing on his work and more than 500 making references to it (Jones & Karsten, 2008). The Information Systems field has also made some theoretical development of the theory in order to better fit the technology field; for instance the “Duality of technology model” and the “Practice Lens” by Orlikowski (1992, 2000), and the “Adaptive Structuration Theory” by DeSanctis and Poole (1994).

I find Structuration Theory interesting to the Information Systems field because a similar tension as was the case in sociology (the subjective versus objective issue) is found in the Information Systems field concerning whether technology shapes society (technological determinism) or if it is society that shapes technology (social determinism). In the Information Systems field there are proponents for both strands but I have always felt an unwillingness to position myself to either strand, intuitively feeling that it is a little of both. I believe that even though technology is constraining much action (anyone having done some hours work with a computer must find it hard to argue with that!) but at the same time it is people drawing on various structures (organizational, societal etc.) that also shape how the technology is used. By adopting Giddens’s view of duality, as opposed to dualism, we can move away from the polarizations between “technology shapes” and “technology is shaped by” by arguing, just like Giddens, that it is both ways around.
Because Giddens in his descriptions of Structuration Theory hardly ever mentions technology he has left the field open for Information Systems researchers to interpret the concept of structure in relation to technology in many different ways.

An interesting conflict in interpretations of Structuration Theory, and of importance for this thesis, is the difference in how some Information Systems researchers see structures as embodied in technology whereas others see structures as emerging from technology use. From the first strand (technology as embodying structures) we find applications of Structuration Theory where technology is seen as a resource that becomes embedded in daily routines or work practices or as tool of power, a finished artefact that stipulates certain forms of human interaction (Barley, 1986; Walsham, 1993; Walsham, 2002). From this point of view, computers (or any ICT for that matter) produce meaning by providing representations of interpretative schemes (e.g., ontologies, symbols), exercise power and control (over facilities) and encapsulate norms (e.g., standards, etiquettes).

An example from this perspective is the often cited study by Barley (1986) where he looks at technology as a catalyst for change of organizational structure. His case studies show that the introduction of technology changed the organizational structure in different ways at different organisations, but even though pointing to different organizational and social changes the technology per se is seen as static and non-modifiable. Other interesting studies by Walsham (1993, 2002) use Structuration Theory in a dualistic way where technology is not seen to determine human action but rather as a link between human agency and structure and thus deeply involved in the duality of structure. The computer is here seen as an allocative resource used in the process of signification, domination and legitimation and thus seen to embody structures by itself:

“Computer-based information systems [...] embody [italics added] interpretative schemes, provide coordination and control facilities, and encapsulate norms. They are thus deeply implicated in the modalities that link social action and structure, and are drawn on in interaction, thus reinforcing or changing social structures” (Walsham, 1993, p. 64).

No matter how interesting and informative these uses of Structuration Theory are they are not suitable for the research I have conducted. For one thing, to view technology as having structures embodied in them disables descriptions of

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9 In criticizing Barley’s notion of technology as static it should, however, be mentioned that his study concerned the use of medical scanners which may not be as easy to modify, or use differently, as other technologies.
non-use of technology which I find equally important to describe. Secondly, if adopting Barley’s view on technology as something fixed and static we cannot account for all different, not always intended, uses of technology that I observed during my visits to Bangladesh and Sri Lanka. If I, for instance, had decided to only look at the ‘effects’ of the LMS-use the findings would have been different because the assigned LMS did not make that much of a difference. Instead, by taking the starting point in what the students do with technology I found many uses, related to the e-learning course, going on.

“Focusing attention on how structures are constituted and reconstituted in recurrent social practices acknowledges that while users can and do use technologies as they were designed, they also can and do circumvent inscribed ways of using the technologies – either ignoring certain properties of the technology, working around them, or inventing new ones that may go beyond or even contradict designers’ expectations and inscriptions” (Orlikowski, 2000, p. 407).

The implication of Barley’s “sequential model of structuring” (Barley, 1986, p. 82) thus makes an application to this thesis difficult. The varying and flexible uses of technology in my case studies would not allow a description based on technology as a black box with pre-described interaction possibilities. It would not be fruitful from a development perspective either because viewing ICT as a “monolithic and homogeneous entity” rules out the opportunity to explain various uses and impacts in development initiatives (Sein & Harindranth, 2004).

In Adaptive Structuration Theory DeSanctis and Poole (1994) draw on Giddens’s ideas of structures as emerging and point to a mutual influence of technology and social processes. DeSanctis and Poole acknowledge that actual technology use frequently differs from intended use and they take a great interest in technology-triggered changes. Adaptive Structuration Theory has also been expanded by Gupta and Bostrom (2009) into a model specifically dedicated to technology-mediated learning. Due to these reasons Adaptive Structuration Theory could have been an interesting option for this research, but there were two issues that made me not use it. One issue was that the theory builds on the notion that you have to study the structures that are provided by technologies. This is something which does not fit within my scope of research because I want also to be able to describe structures that are enacted when not using technology. The second issue that made me hesitate was Adaptive Structuration Theory’s notion of ‘propositions’
(DeSanctis & Poole, 1994). The underlying idea with these propositions is (simply put) that given a certain technology, a certain task and users of a certain mindset, outcomes can be predicted (DeSanctis & Poole, 1994; Jones & Karsten, 2008). These kinds of propositions imply a causality that is not in line with my research perspective which builds on the assumption that reality is socially constructed and therefore complex and non-predictive.10

The other strand of Structuration Theory use in Information Systems research (e.g., Halperin, 2005; Jones, 1999; Orlikowski, 2000) has challenged the notion of technology as a structure, usually by pointing back to Giddens’s description of structures as only existing as memory traces and instantiated in human action: “To suggest that structure may be somehow fixed into the technology is to separate it from agency and hence to turn Giddens’s carefully constructed duality back into dualism” (Jones, 1999, p. 127). Or, if using one of Giddens’s rare statements on technology: “technology does nothing, except as implicated in the actions of human beings” (Giddens & Pierson, 1998, p. 82).

Since I, in my applications of Structuration Theory, have built mainly on Orlikowski’s notion of “Technology-in-practice” I will let her theories represent this other view on structures as emerging. For reasons of clarity I will, however, first briefly go through Orlikowski’s first proposed structurational model of technology (Orlikowski, 1992), even though it has some ‘embeddness’-aspects in it, before moving on to her ‘Technology-in-use’ model (Orlikowski, 2000).

Duality of Technology and the Structure of “Technology-in-practice”
Orlikowski’s first proposed use of Structuration Theory for the IS field was called “The Structurational Model of Technology” (Orlikowski, 1992) and was based on the premise that technology is created, altered and used by humans to achieve something. Another premise was that technology is interpretatively flexible. This means that it is used and interpreted differently by different actors during different circumstances and contexts (even within the same organisation) and that technology is almost always modifiable during its lifecycle. Figure 4 (next page) shows this mutual influencing.

10 In a slideshow uploaded by Poole in 2009 (http://www.slideshare.net/ajacob/adaptive-structuration-theory) he does however write about group dynamics being too complicated to be reduced to simple propositions. This may indicate that Adaptive Structuration Theory is moving beyond this kind of determinism.
This structuration model of technology shows that technology is a product of human agency (arrow a) – we program the software, design the interface, build the hardware and modify the system and so forth. At the same time technology enables and/or constrains our action by being the very medium for action (arrow b) through the norms, facilities and interpretative schemes embedded in the system. All this action takes place in a certain setting – a university for instance – and this setting’s institutional properties stipulate the agents’ interaction with the technology (arrow c). These institutional properties can refer to rules set by the IT Unit, norms of conduct or the economic framework. Additionally, technology also has an affect on the institutional properties by either reinforcing or altering the structural dimensions of signification, domination and legitimation (arrow d).

If using the university as an example we can see that new administrative systems often reinforce an organisational wish to standardise staff behaviour at the same time as the power of, for instance, the economy department can be altered by letting the staff themselves fill in which accounts to charge. The Structuration Model of Technology clearly shows a mutual influencing between actors, technology and organization.

Orlikowski, contrary to many other Information Systems researchers using Structuration Theory, thus early accounted for the duality of technology, i.e., that technology shapes and is also shaped by humans. However, her first proposition suggests a view where technology is seen as an isolated artefact that is separated from (direct) human agency. Eight years later she would, however, redress this problem of structure embodiment by adopting a quite different standpoint to
that of her 1992 - paper (Halperin, 2005; Jones & Karsten, 2008). She would in her “practice lens”- paper make a separation between the technological artefact and “technology-in-practice” by arguing that technologies do not have structures embedded in them. It is not the technology that contains the structures; it is human actions that contain and reinforce structures through repeated enactment:

“If, however, we focus on emergent rather than embodied structures […] an alternative view of technology use becomes possible – a view which allows us to frame what users do with technologies not as appropriation but as enactment. Thus, rather than starting with the technology and examining how actors appropriate its embodied structures, this view starts with human action and examines how it enacts emergent structures through recurrent interaction with the technology at hand” (Orlikowski, 2000, p. 407).

She proposes a framework (or ‘practice lens’ as she calls it) over the enactment of technologies-in-practice (Figure 5) which has a focus on structures enacted and emerged when using (or not using for that matter) technology. The structures are not seen as embodied in the technology but in practice:

As the figure shows, technology-in-practice is the structure and as such it consists of the modalities of facilities, norms and interpretive schemes. Facilities refer to
the hardware and software used – “properties comprising the technological arte-
fact”; norms refer to protocols, rules and etiquettes in using the technology; and
interpretive schemes refer to the assumptions and knowledge in relation to tech-
nology use – “skills, power, knowledge, assumptions, and expectations about the
technology and its use” (Orlikowski, 2000, p. 410). The norms and interpretive
schemes that Orlikowski describes refer to the technology as such or to technol-
ygy-related functions such as IT support rules and regulations.

As previously mentioned, my use of Structuration Theory builds mainly on Or-
likowski’s notion of technologies-in-practice. However, Giddens’s theory has
been said to be hard to apply empirically and Orlikowski’s model mainly focuses
technological modalities, so research addressing these gaps will now be discussed.

2.9.2 Empirical Application of Structuration Theory

Giddens’s Structuration Theory is at a very high level of abstraction and has often
been criticized for being hard to understand and hard to apply empirically
(Halperin & Backhouse, 2007; Pozzebon & Pinsonneault, 2005; Rose, 1998). It
is a “frustratingly underspecified” theory (Sewell, 1992, p. 5) and the concepts
used are voluminous and often contradictory to generally accepted concepts from
sociology. This of course makes the theory hard to grasp. Whereas Orlikowski’s
re-conceptualization of the theory was very clarifying I still found it leaving too
little guidance for my empirical analysis.

This lack of guidance was acknowledged by Halperin who in her thesis
(Halperin, 2005) and a following paper with Backhouse (Halperin & Backhouse,
2007) elaborates the key constructs of norms, interpretative schemes and facility
further by increasing their granularity. In their paper they point to a gap in Struc-
turation Theory regarding the operational application of Structuration Theory to
Information Systems research, i.e., the data collection and analysis process.
Halperin and Backhouse (2007) have elaborated these key structurational con-
structs further through an additional breakdown of the modalities. As an alterna-
tive to seeing technology as one whole, modules of the architecture (i.e., different
 technological features such as tools attached) are used as units of analysis instead.

Furthermore, due to modern technologies’ flexibility in allowing for continuous
modifications they also stress the need for documenting any changes to technol-
yogy. As for norms they suggest that they should be divided into formal or informal
norms and categorized according to their degree of sanction.

Moreover, Halperin and Backhouse offer a broadened view on interpretive
schemes by encompassing other ‘knowledges’ than that of technology. In their
paper they use the example of learning through a LMS and by pointing to interpretive schemes’ practice-specific nature they suggest to analyze them according to the students personal theories of knowledge and knowing.

Halperin and Backhouse have also extended Structuration Theory by introducing clearly specified methods for gathering and analyzing data. In their paper (Halperin & Backhouse, 2007) they propose a methodology, or framework, for how to capture norms, interpretive schemes and the various characteristics of the technology used. This methodology helped me a lot in the last study (paper VI – Learning from e-Learning).

2.9.3 Using Structuration Theory as Analytical Tool

In this thesis the use of Structuration Theory as an analytical tool builds mainly on Halperin and Backhouse’s (2007) work and each modality is defined as follows:

- **Facilities**: Technologies used broken down into each relevant function (or property) in a system of technologies.
- **Norms**: Norms refer to what is the accepted behaviour. These norms can be broken down into formal norms (i.e., official rules and guidelines documented in written form) and informal norms (i.e., conventions reflected in common behaviour – ‘shoulds’). The norms can also be analyzed according to their level of sanction – i.e., how strongly or weakly a norm is understood and enforced. For example: a strongly sanctioned norm could be manifested in how a student fails a course if not participating in on-line discussions, whereas a reprimand to the student saying “please interact more next semester” could reflect a more weakly sanctioned norm by being ambiguous and unclear.
- **Interpretive schemes**: Interpretative schemes refer to the actors assumptions and beliefs that they draw upon when using (or not using) the technology or some of its properties. These beliefs, or ways to perceive the world, not only refer to technical knowledge but to all ‘knowledges’ influencing the use, e.g., thoughts on the role of interactivity and peer collaboration, beliefs about how one learns.

My Structuration Theory analyses have aimed at tracing structuring processes by letting the analytical levels of facilities, norms and interpretative schemes guide the analysis. The sequencing of the analysis has varied. In one paper I started by mapping out the technological properties (facilities) available and thereafter
interpreted actions and statements found in relation to the same time period that these facilities were used. In another paper I took the starting point in the support functions asked for and translated the reasons given for wanting this support function into norms and interpretive schemes. In the final paper I used interview transcripts and observations of students to identify which beliefs and norms they drew on in using technology.

Depending on the purpose and design of each study the level of granularity of analysis units have also varied.

In the paper on increasing interactivity (paper IV – Increasing Interactivity in Distance Educations) I wanted to identify changes in teachers’ and students’ beliefs and values when provided with more possibilities for interactivity. I took a historical perspective where I traced changes to technology over time and thus the facilities (technologies) used were much in focus. I identified all technologies that could be used for interactivity and broke down each technology into each function that could provide interactivity. Since I took a long-term perspective I could also make the distinction between formal and informal norms. Regarding formal norms I could trace changes in the rules and regulations dictating the use by looking at rulebooks for different years. Furthermore I assessed the norms according to their level of sanction (i.e., how strongly or weakly a norm is understood and enforced) by looking at which norms were reinforced and which were abandoned. In regards to interpretive schemes I mainly focused on the students and teachers assumptions and beliefs drawn upon in using, or not using, the interactive functions that were provided. I wanted to capture beliefs in regards to the role of interactivity and chose to focus on beliefs about interactive learning practices (e.g., is it good for learning?) and also practical assumptions about interactive learning practices (e.g., is it feasible?).

The purpose of the study underlying the paper on learning e-learning (paper V) was to analyze if and, if so, in what way e-learning students adopt the underlying norms and assumptions presumed in the e-learning design. In this study facilities were of course described, but not in the detailed way it was in the previous study because the ‘e-learning design’ refers more to the set-up of e-learning and not only to the technology use (e.g., students studying by themselves, using some technologies, going to learning centres or not). Furthermore the design of the study was to measure which support functions were seen as most important and to interpret why they were seen as most important. The focus unit for interpretive schemes was thus which assumptions students drew on in preferring a certain
support function. The analysis of norms only referred to informal norms by focusing on the attitudes (accepted behaviour, how things should be) related to different support functions.

In the final study “Learning from e-Learning” (paper VI) I explicitly looked for which uses of technology that could support a constructivist learning model. While having a strong focus on technologies transformative potential the analysis of the technology was not very detailed due to the design of the study. The study mainly built on self-report information from 23 in-depth interviews with students and even though the interviews were complemented with observations no detailed charting of their technology use was made. I wanted to stay close to these 23 students narratives and therefore did not include other sources for information. The structure analysis in this paper built on all three modalities (facility, norms and interpretive schemes) but the strongest focus was on the students’ beliefs and assumptions about their learning practice related to the technology used.

Structuration Theory has thus been used as a tool-box where I have picked concepts and levels of granularity as I have seen fit. In this sense I have met the challenges related to Structuration Theory being at the same time voluminous and underspecified according to Giddens's own suggestion. In replying to the criticism on Structuration Theory being hard to apply empirically Giddens explicitly points out that the concepts in Structuration Theory “should for many research purposes be regarded as sensitizing devices, nothing more” (Giddens, 1984, p. 326). What he offers is “a set of ‘sensitising’ concepts that might prove useful in social analysis generally and social research in particular” (Layder, 2006, p. 156).

Based on Halperin and Backhouse’s (2007) suggestions for Structuration Theory data collections I have used observations and interviews to capture the actions of students (i.e., which facilities they are using), and project documentation, observations and interviews to capture norms.

For interpretive schemes the main approach has been to interpret the informants’ subjectively described ways to perceive whatever I have been asking for (e.g., interactivity, learning, knowledge). For example, during a participatory observation a student showed me a discussion forum that he and some friends had developed. By looking at this forum I could see which technological properties they were using (facilities such as chat-functions and threaded discussions) and from my
interview transcript with the same student I read that he learns better through this forum because:

“During discussion times I try to get a good knowledge in the modules. If we deeply discuss with others and share what we have – even if it is wrong or not – and go through for the new ideas or any important parts that are not included in the syllabus. We should join with the group studies and share the knowledge with them.”

From these three sentences I could extract a norm that says that you should share – “We should join with the group studies and share the knowledge with them”. I could also elicit the interpretive schemes that this norm draw on: a) that knowledge is seen as being constructed and negotiated – you “get a good knowledge” if you “deeply discuss with others and share what we have”; and b) that knowledge is seen a relative and not fixed – you should share “even if is it wrong or not – and go through for the new ideas”.

In summation, my uses of Structuration Theory have been to trace structuring processes by using Structuration Theory concepts as analytical tools, and also to test Halperin’s version of the theory. Jones and Karsten (2008) positioned existing structurational Information Systems research as belonging to one of three broad strands: application of structurational concepts; development and application of an IS-specific version of Structuration Theory; and critical engagement with Structuration Theory. My research mainly falls within the first strand since I have based my analyses on Structuration Theory’s concepts of interpretative schemes, norms and facilities. In this way I have found more nuances in my informants’ stories and gained a better understanding of their actions. My research also falls within the second strand (development and application of an IS-specific version of Structuration Theory) by applying an IS-specific version of Structuration Theory (i.e., Orlikowski’s Practice Lens as extended by Halperin and Backhouse) in a new setting and thus testing its appropriateness for this setting.

To end the discussion on Structuration Theory, I will sum up my motives for applying it to my research.

First of all, Structuration Theory is a frequently used theory in the Information Systems field and has proven to have high explanatory power when it comes to technology introductions, especially in relation to the context of organizational
change (e.g., De’ & Ratan, 2009; DeSanctis & Poole, 1994; Orlikowski, 1992). This attracted me since my research is also about change, particularly in relation to students’ behavioural change when technology is used to disseminate and transform education where no technology has been used before.

Duality focuses on how students and technology are related and how new learning practices emerge through this interaction. The research in this thesis concerns how technology has been used in distance educations to facilitate a change towards constructive learning practices, and how this has been an intrusion of the existing educational structure. Many of the challenges experienced in implementing e-learning in these cases refer to changes of, and conflicts between, different structures.

Early during this research, when I was targeting challenges to e-learning, I found most explanations constantly being addressed to different norms of conduct, attitudes and general notions of how things should be done. The reasons given were most often of a ‘taken-for-granted’ manner which is one of the most characteristic features of a strong structure. If structures are reinforced by ”routinization” – “the habitual, taken-for-granted character of the vast bulk of the activities of day-to-day social life” (Giddens, 1984, p. 376), then deroutinization is something that starts happening when an influence (in my case the external delivery of education supported by ICT) opposes this ‘taken-for-granted’ character of the activities of day-to-day social life (Gynnild, 2002).

In both cases the education system was challenged by these new circumstances, not only because of the introduction of technology but because e-learning requires different ways of assessing students, new pedagogical models and so forth. Technology not in use or in limited use can also be explained by stronger structures inhibiting the use. Structuration Theory can thus be applied as a tool for describing a structure in relation to other, sometimes competing, structures enacted in the use, or non-use, of technology. Even though Structuration Theory is not a theory for either technology or education it has “great potential for analysing situations of change” (Gynnild, 2002, p. 297).

Secondly, by adopting Orlikowski’s (2000) and Halperin and Backhouse’s (Halperin, 2005; Halperin & Backhouse, 2007) ideas of tracking structuration processes over time I was able to identify even small changes to the students’ mindsets. By analyzing the students’ actions in relation to their beliefs about learning the very structure that these students draw on could be identified. During my first visits to Bangladesh and Sri Lanka I observed many different uses of the
assigned technologies for e-learning and this is what initially attracted me to Structuration Theory.

I noticed how some prescribed uses were neglected whereas other uses were changed or even invented. I realized that I could not pretend to measure the ‘effects’ of the introduced technologies in a snap-shot manner, but that I needed to follow the practices as they emerged during further field visits. By using Structuration Theory’s modalities as analytical tools I noticed that I was able to identify many conflicting norms and interpretative schemes that could otherwise have been easily misunderstood. This provided the analysis with a transparency and sensitivity to the empirical material that I believe is of particular importance when researcher and the object(s) of study are at such a distance (geographically, socially and so forth) as in this case.

This discussion ends the methodology chapter and I will now describe the case studies in which my methodology has been applied.
3

CASE STUDIES

3.1 Sri Lanka: eBIT

Educational context

Education in Sri Lanka before the colonial period was mainly conducted at village level by Buddhist monks who taught the Sinhala alphabet and literatures on the Buddha. Most Tamils went to village schools located close to Hindu temples where they were taught by Brahmans. Higher education was only available for a selected few (Ross & Savada, 1988). With the arrival of colonizers an education system was built based on European values which mainly prepared students for positions in the colonial administration (Ross & Savada, 1988). With more independence and democracy the “Free Education Scheme” was launched in 1945, stipulating that education from kindergarten to the first degree in university is free (Warnapala, 2009). Schools were set up in rural areas and in 1942 the first university (University of Ceylon) was opened. By the time of independence in 1948, Sri Lanka had a well developed education infrastructure (Ross & Savada, 1988).

Education-wise Sri Lanka performs very well for a developing country. Education is highly prioritized (Ross & Savada, 1988) and enrolment for primary school has been well above 90 percent for two decades (UNESCO, 2009; World Bank, 2009a). The current education system in Sri Lanka derives from the British and consists of: Primary Schools, Lower Secondary and Higher Secondary Schools.
In Sri Lanka most undergraduate students go for private tuition after school. This private tuition is conducted by school teachers and comes with a fee. Higher education in Sri Lanka is heavily dependent on Government funding (Warnapala, 2009) and competition for university is tough. Even though education in public universities is free it is very limited. In 1965 only 20 percent of qualified applicants were admitted to university (Ross & Savada, 1988) and today the equivalent is even lower – only 10 percent of those qualified get admitted (UCSC, 2004). Those who are not admitted to university often enrol for an external degree provided by the universities.

After independence the language of instruction was changed from English to Sinhala and Tamil in the primary and secondary education. At most universities, however, English still remains (Ross & Savada, 1988). The language of instruction has also become a political issue due to the conflict in the country, where so-called ‘peace educations’ such as eBIT intentionally have chosen the English language. Due to students having problems with the English medium (as reported in paper II) the content and LMS used in eBIT is now gradually being translated to Sinhala and Tamil.

The students in the eBIT case study describe the school system they are used to as a model based on teacher transmission. They describe large classes, where many students are afraid of their teachers and where learning activities are mainly based on memorizing and repetition of teachers’ words.

“Actually, in a class in a situation like that some students are not hearing and some are not learning, but in Sri Lanka the class...the students are so many and in a class there are 50 students, like, so its really hard to... even for a teacher it’s really hard to concentrate for all the students. So I think that’s the problem really. [...] And no, no you don’t [talk to the teacher]. Because in Sri Lankan classes there are so many people in a classroom, you know. So there is no way to talk to teacher. And even they don’t even see, look at our books, you know” (Two Sri Lankan students).

“When I was smaller, yes, in Sri Lanka there is a problem – teachers are... all the teachers are frightening the kids. They are frightening them. They are not used to raising their hands up and asking the question directly” (Sri Lankan student).
In the eBIT case an aim was consequently to “facilitate the paradigm shift from teaching to learning” (UCSC, 2004, p. 4). During a meeting with the IT industry in Sri Lanka the representatives also urged the steering board of UCSC to “produce people that know how to learn” and many efforts, through seminars and technical applications, have been made to promote this shift. Findings in my studies show that many students are changing their learning practices, but also that these changes take time. As one of the project managers put it when talking about the shift from teaching to learning:

“That shift will happen. But this is a kind of a prediction, an expectation of what will happen, how it will happen. Because there are some challenges with that one. So it will take some years to see whether... if expectations will work out or not. But the current indicators look like we are staying on the right track. We may not be a 100% successful but we will be able to make some significant success. I hope” (Project manager 2008).

The eBIT Project
The University of Colombo School of Computing (UCSC) provides graduate programs at campus in Colombo for internal degree students, but the vast majority of the students study at a distance (external degree students). The external degree is an option for all those students that have the right qualifications for admittance to university but cannot attend due to work, geographical distance or simply because there is not enough admissions at the university. In year 2000, UCSC started providing the Bachelor of Information Technology (BIT) programme for external students in response to a perceived need for more diversely skilled IT personnel in Sri Lanka. Before that the universities only produced strict code writers by having all computer courses habitually restricted to students of the mathematical stream. The external BIT program (eBIT), on the other hand, gives admission to students from other fields such as Arts, Commerce and Bio Science – something that also increased the number of female applicants to the programme. The duration of the BIT degree programme is three academic years. After first year the student is awarded a Diploma in Information Technology, the second year grants a Higher Diploma in Information Technology and the third, and final year, yields the Degree Certificate (the BIT).
By 2003 UCSC established an e-learning centre and eBIT was the test pilot. More than 20,000 students have been admitted since the start and every year approximately 1500 new students register. Drop out rates were initially very high with an average BIT graduate rate of 1.5% in year 2003 and 2004 (Hewagamage, 2005). This was mainly ascribed to students being left to self-studies only supported by a very general syllabus including some reading instructions while waiting for the exams that were conducted at the end of each period (Stockholm University, 2004). As a remedy for this the eBIT project started with the aim of launching a completely new Internet-based version of BIT. The hope was to drastically increase the number of graduating students by using collaborative pedagogical methods and making effective use of e-learning (Stockholm University, 2004). The aim of the project was also to provide education to rural parts of Sri Lanka and to “facilitate the paradigm shift from teaching to learning” (UCSC, 2004, p. 4). In year 2008, the eBIT online courses were accessed by more than 3500 students (Candia, 2009).

The program has been accessed via two different Learning Management Systems (more on these below) and the students can chose to follow the program by self-studies or by going to learning centres teaching the BIT curriculum. UCSC made arrangements with these learning centres island-wide in order to widen the accessibility of eBIT. In 2008–2009 Sri Lanka had around 4–5% Internet users11 (ITU, 2009) and many students therefore go to Internet cafés or learning centres in order to access the LMS.

Technologies Used
In the delivery of eBIT different technologies have been used and altered based on curriculum revisions made. In year 2000 there were hardly any technologies in use at all except for a static website including the same written information as in the printed student handbook. At this website students could download the syllabus and study guide and they were also offered a preparatory course broadcasted via TV.

The first curricula revision in 2003 resulted in the introduction of the first LMS: “The Education”. This LMS included the syllabus for each subject and an online assessment that was given before the written exams at the end of the semester (Hewagamage et al., 2005). The LMS was supplemented by TV, radio and

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11 An estimate based on sampling surveys and number of subscribers. ITU indicators are described at: [http://www.itu.int/ITU-D/ict/handbook.html](http://www.itu.int/ITU-D/ict/handbook.html)
CD-ROM for students not having access to Internet. The official norm was that learning should be based on collaborative pedagogical methods (Stockholm University, 2004), building on the assumption that learning is based on collaboration and co-construction of knowledge (UCSC, 2004; Stockholm University, 2004). It was believed that a collaborative model could be implemented by the aid of technology and interactive online group assignments were made compulsory. Collaborations and interactions were, however, few and many cases of cheating within groups were observed.

The next curricula revision in 2006 replaced the “The Education” LMS by the LMS Moodle\textsuperscript{12}. The explicit aim was to implement a collaborative learning model by giving students online interactive feedback (Hewagamage, Wickramanayake, Weerasinghe, & Mozelius, 2007). The possibilities for interacting with the learning materials increased with this LMS and available features range from quizzes, self-assessments to interactive animations and various discussion forums\textsuperscript{13}.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure6.png}
\caption{Content Developer creating an eBIT online assessment}
\end{figure}

By the end of 2009 some of the content of the LMS (including discussion forums and quizzes) was also made available through the use of mobile phones (http://vle.bit.lk/m/). Figure 7 (next page) shows a screen-shot of the entry side for the LMS, followed by a table on the properties of this LMS (Table 4).

\textsuperscript{12} Moodle is a free open source LMS.

\textsuperscript{13} To “interact with learning materials” refers to when students use technical applications where there is interplay going further than one way, i.e., when students use learning material that is designed to be responsive to their actions.
Table 4: Properties in eBIT LMS

<table>
<thead>
<tr>
<th>Function</th>
<th>Technological properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to learning material</td>
<td>Power Points (Teachers notes), recorded video lectures</td>
</tr>
<tr>
<td>Interaction with learning material</td>
<td>Java applications, Flash animations, Javascript, Turbo demo, Camtasia video</td>
</tr>
<tr>
<td>Learning by doing</td>
<td>Database for experimentation, code writing for execution, turbo demo activities</td>
</tr>
<tr>
<td>Self-assessments (including feedback function on the answer)</td>
<td>Online Multiple Choice Questions (MCQs): Radio boxes, Drag n’ Drop, Scroll lists, fill-in-blanks, drag n’ draw; interactive activities with feedback/guidelines and score board</td>
</tr>
<tr>
<td>Communication with teacher</td>
<td>e-mail, discussion forum, chat</td>
</tr>
<tr>
<td>Communication with fellow students</td>
<td>e-mail, discussion forum, chat</td>
</tr>
<tr>
<td>Guidance and scheduling support</td>
<td>Downloadable Pdfs and Word documents (Student manuals, guides), online calendar, practice quizzes online facilitation, TV programmes</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Online questionnaires</td>
</tr>
<tr>
<td>Final assessment (summative)</td>
<td>Online MCQs without feedback</td>
</tr>
</tbody>
</table>
If we look at the functions in the LMS in relation to different pedagogical ideals we find that they are not homogeneously designed. Applications with a behaviouristic tone are frequently used for self-assessments of single, rather simple, skills using variations of Multiple-Choice-Questions. Furthermore there are numerous discussion forums and chats for discussions with facilitators and peers (for co-construction of knowledge) as well as more cognitive applications using a lot of multi-media for visualization and simulations. This mix of many different learning interactions supports many different learning styles and allows for individuality. If a student is confused in how to learn there are facilitators to guide the student in an online facilitation forum.

Achievements
The overall performance of the project has been positive. More students have graduated from the program and the average pass rate has continuously improved. We also found that students after the introduction of the Moodle LMS performed better in their first attempts of examinations (i.e., less re-sits of exams). This also meant that an increasing number of students moved to higher levels of the eBIT programme (Candia, 2009).

These positive outcomes of the eBIT project are due to many interrelated factors. Management has been strong and committed and Instructional Designers and Content Developers have been very skilled. An additional reason is probably that much staff education and training have been undertaken. In the final evaluation of eBIT (Candia, 2009) we found that a substantial amount of staff, around 150 in total, had been trained in various areas such as learning pedagogies, constructive alignment, facilitation, content development and programming techniques.

One of the aims with eBIT was to provide education for the rural parts of Sri Lanka, but rural enrolment has been comparatively low. Most candidates are from the western Province (Colombo, Gampaha and Kalutara), where the larger cities are located. An assessment, however, showed that at least 10% of students enrolled in 2008 were living in rural areas of Sri Lanka. Furthermore, the number of students from remote areas taking the first year diploma has increased and the program has been awarded with UNESCO’s recognition for contributing to the provision of “Education for All” (Candia, 2009).
3.2 Bangladesh: Bangladesh Virtual Classroom

Educational Context
During medieval time education in Bengal was highly encouraged by the two major religious groups – Hindus and Muslims – even though their educational systems differed (Banglapedia, 2006). The Hindu education taught religion, mathematics and logic, and the Islamic education taught the Quran and some profession (vocational training). During the British colonial era the education system aimed, just as in Sri Lanka and India, to produce administratively skilled personnel for the colonial administration (Heitzman & Worden, 1989). For this reason the oriental languages were first kept (since the British needed people that could speak and write Persian, Sanskrit and Arabic for administrative purposes). Gradually, however, the British system of education was implemented with increasing use of English language in order to expand British administration (Banglapedia, 2006).

After India and Pakistan became independent in 1947, today’s Bangladesh came under Pakistani rule as East Pakistan. Despite independence from England, the British legacy was deeply rooted. Many pre-independence institutions remained where content and medium of instruction were English (Banglapedia, 2006). After independence from Pakistan (1971) primary education became the responsibility of the government and the government issued a ‘Decree of Nationalisation’ of all primary schools through the Nationalization Act of Primary Education of 1973. English mediated instruction has since then mainly been available for the richer parts of the population that go to private schools. Lately, there has however been a reopening of public English language schools (especially those run by the Armed Forces). School enrolment is steadily increasing, but there is still a very large number of out-of-school children (Banglapedia, 2006; World Bank, 2008).

Having been under British control, the education system in Bangladesh is just as the Sri Lankan built on the British model (Heitzman & Worden, 1989) broadly divided into three major stages: primary, secondary and tertiary education (BANBEIS, 2009). The system with fee-based private tuition after class is also the same as in Sri Lanka. The base of the school system is five years of primary education, but retaining students in the system is hard (Heitzman & Worden, 1989; UNESCO, 2009).

Very similar to the Sri Lankan students, students in Bangladesh describe their educational setting as taking place in large classrooms where they are often afraid
of their teachers. The strategy for learning they have employed during their school-years is to learn by memorizing:

“We have a British heritage really. Our structure is not good, really it is no good. It’s because... you know we are poor. Our education system has not improved for thousands of years. I remember how in one class there is 40, 60 or 75 students and you know for one teacher it is not possible to maintain a 75 or 60 students class. So that is a problem – the students do not learn from the teachers. So what they do is they go to teachers privately and pay money to learn [...] but here again the problem remains that we learn to memorize things, we don’t use our brains. [...] We memorize and write something and forget everything after the exam” (Bangladeshi student).

“Everyone is afraid of their teachers. Every single person in Bangladesh is afraid of their teacher” (Bangladeshi student).

The descriptions above are important to bear in mind when considering the efforts made to change the learning culture in the BVC case. With its ambition to increase interactivity (Grönlund & Islam, 2008) this pedagogical setting was found to be a challenge. In order to meet this challenge a teacher education was given in relation to the start-up of BVC which aimed for improving the teachers’ pedagogical skills. The education program was partly assisted and financed by SPIDER, but all design and content were created by BRAC’s own teachers. The report from the workshops (BRAC, 2006) shows a strong constructivist strand where students’ previous experiences, the teacher’s role, feedback, and evaluation are central issues. Objectives relate to issues such as:

- Making participants understand that an instructor is a coach that helps students reach their potential and become a better person.
- To become aware of the types of student teachers interact with.
- Getting students to participate and taking ownership of the course.

As a poetic illustration of the aims of the program a teacher wrote in the report: “all of us is born with pair of wings and we as teachers are given the role of being the flight instructors who carefully need to give the students proper means and resources to learn how to fly” (BRAC, 2006, p. 8).
The Bangladesh Virtual Classroom Project

Bangladesh Virtual Classroom (BVC) focuses on using electronic means to provide education to rural areas in Bangladesh. The project was initiated by BRAC University in Dhaka in 2005 and builds on an idea to increase interactivity by using existing technologies – TV and mobile phones. Internet is expensive and impractical due to bad infrastructure and low computer literacy in the rural areas. As an example, in 2006 Bangladesh had 0.3 % Internet users and in 2008 around 28 % mobile phone users (ITU, 2009).14

Initially several pilot studies were conducted (2005–2007) resulting in a methodology to deliver interactive distance courses to the learners via mobile phones and TV. These pilots were mainly conducted at BRAC University where classes were split and one group received traditional lecturing whereas the other group used the TV and mobile phones (as reported in e.g., Islam, Rahman, Rahman, & Ashraf, 2005; Islam, Rahman, Razzak, Saye & Zaman, 2006). During this first phase of the project further test trials of the system were made and education of trainers was conducted, but most time was spent on searching for feasible solutions considering partnerships and outreach. The first positive response came from Bangladesh Open University (BOU) which enrols approximately 250,000 students per year. BOU is charged with the task of delivering education to rural areas, and has an extensive network of 1300 tutorial centres for its 19 programs throughout Bangladesh. In Bangladesh less than 7 % of students continue to tertiary education (UNESCO, 2008) and BOU takes on more than half of the students that do (Islam, Rahman, & Rahman, 2006). The BOU educations, however, suffer from low throughput and only 12% of students are estimated to sit the exams. Problems relate to the lack of interaction between teachers and students and “traditional inefficient teaching methods” (Grönlund & Islam, 2008, p. 1565).

BOU was always committed to the project, but it was not until 2007 with a new dedicated Vice Chancellor that the first field tests could take place during the spring semester (Grönlund, 2007). By 2008 BOU started recording the first lessons for a 2nd year higher secondary level course in English which enrols an estimated 70,000 students all over Bangladesh and the first 29 videos were broadcasted on TV (every Saturday morning at 07.00).

14 The estimate for Internet users is based on sampling surveys and also number of subscribers. The number of mobile phone users is estimated based on subscriptions (post-paid and pre-paid). ITU indicators are described at: http://www.itu.int/ITU-D/ict/handbook.html
Technologies Used
The Bangladesh Virtual Classroom (BVC) is an e-learning project that uses SMS of mobile phones along with television broadcasts to create a classroom feeling for distance learners. The aim of BVC is to create an interactive learning environment using available technology (Grönlund & Islam, 2008). Even though BVC targets distance mode students, face-to-face teaching is still seen as the best way to deliver education. The belief is that technology can be used to create a perceived face-to-face teaching environment (this is described more in detail in paper IV – Increasing Interactivity in Distance Educations). The teacher has a real class present during the recordings and the teacher addresses both the students in the classroom and the distance students via the camera.

The system is designed to allow for SMS and voice communication with teachers and peers. In addition to this the student can interact – via SMS – with the content on the SMS server. Due to government regulations BOU is not allowed to send live television so pre-recorded TV programs had to be used.

Figure 9 (next page) illustrates the basic idea of BVC, followed by a table on the properties of the SMS-server (Table 5).
**Figure 9: Sketch over the basic concept of BVC**

**Table 5: Properties in BVC system**

<table>
<thead>
<tr>
<th>Function</th>
<th>Technological properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report presence and attendance</td>
<td>SMS sent to request registration and notify attendance, SMS sent to confirm registration and attendance.</td>
</tr>
<tr>
<td>Access to lectures</td>
<td>Lectures broadcasted on TV every Saturday at 07.00.</td>
</tr>
</tbody>
</table>
| Self-assessments          | Question Answer System: SMS sent on the answer the student thinks is correct, SMS sent back to say if answer is correct. If the broadcast is live the students’ progress can be monitored during a class and the course delivery can be adjusted accordingly by the presenter.  
Self assessment Quiz: SMS sent to server to download a quiz (randomly selected from a database) to the students’ mobile phones based on a chapter read. |
| Interaction with teacher  | Explain answer via mobile phone (voice); give opinion via SMS sent by students (the teacher can ask the students’ opinions about something that they send via SMS for display in the TV). |
Access to learning material

Dictionary: SMS sent to collect an explanation of a word from the database.

Reading comprehension exercises: SMS sent to server. In order to collect a paragraph/text to read (and later summarize) in relation to a session the student can send a SMS to the server. The student is then supposed to summarize the text (in their own words) and send this summary back to the server (in order to later be commented by a teacher).

Interaction with peers

Registration of learning partner: By sending a SMS to the server with a learning partner’s mobile number, and after confirmation by this partner, the students are signed up as learning partners.

From a pedagogical perspective these functions support a mix of different learning models. The paragraph summary (intended for checking reading comprehension in order to avoid straight recapitulations of text) can easily fall within a constructive strand. The self-assessment functions with multiple-choice-questions are more often used for behaviouristic methods but could of course, depending on the skills of the teacher, be formulated in a problem-solving spirit. Functions for interaction and communication can support co-construction of knowledge.

A limitation, from a constructivist point of view, was the limited opportunity for individual exploring. Very few students had any Internet in their mobile phones (or access to other resources) and thus became heavily dependent on what information the teacher had put into the server.

Achievements

The overall impact of the project has been weak. The design of the BVC model allows for interactive and collaborative learning practices, but uses of the SMS functions have been very few. According to the system documentation I found that after one year (May 2008 – May 2009) only 629 students had used the system and on average only once (i.e., one SMS sent by each student). 82 % of these SMS:es were sent on a Friday (when students go for tutorial class) or a Saturday (when the televised lectures are broadcasted).

Reasons for the lack of impact were many and include issues such as lack of promotion, costs of sending SMS:es and lack of content. Several system functions were not developed and the teachers had not filled the database with content.
(e.g., the dictionary only contained seven words, the paragraph function contained very little text and many intended functions were not programmed yet).

In August 2009 when I interviewed seven students that had tried the system (students that did not participate during the recordings of the programs) they said that they had stopped using the system because they tried it a couple of times and when they did not get any reply they did not want to waste more money on it. They did however continue to watch the TV-programs\textsuperscript{15}. During all our observations we have found that students easily use the mobile phones and the different functions, so the reason for the limited use is not due to the technology as such. Apart from the obvious failure with the lack of content, other reasons for the limited use had to do with costs. To send one SMS costs between 0,5–2 Taka (Islam et al., 2006) and participation in a full lesson requires quite many SMS:es sent. Half of the population in Bangladesh lives on less than 87 Taka/day (World Bank, 2009c) so no matter how cheap SMS:es are in Bangladesh it is still not a negligible amount of money. A further reason given by the students was that BOU only broadcasts early in the morning (around 07.00 a.m.) when most distance students are either asleep or on their way to work.

During spring and summer 2009 one of the original programmers was granted some time to improve the SMS-server functionality. The functionality is now improved and the recorded programs were aired again during fall 2009.

From these case study descriptions I will now move on to the theories underlying this research.

\textsuperscript{15} These interviews were taken after all papers for this thesis had been written. But since the project continued I believe it is of relevance to report my findings here.
The field of ICT4D is inherently multidisciplinary (Unwin, 2009) situated within numerous disciplinary frameworks such as Development Theory, Informatics, Computer Science, Pedagogy and Sociology. Unfortunately, the different disciplines seldom meet. For anyone interested in ICT4D it is essential to understand the development context (Kleine & Unwin, 2009; Prakash & De’, 2007; Unwin, 2009), but development studies have often been neglected in ICT4D. On the other hand, development studies have long ignored, or even opposed, technology. This has led to Information Systems researchers often acting in isolation, not engaging with development theories either (Heeks, 2008).

As one consequence of this we find that while education is highly prioritized in the United Nation’s Millennium Development Goals (Selinger, 2009; UN, 2008) and said to be a major key for development (Bada & Madon, 2006; UNDP, 2006; WSIS, 2003), we rarely find a discussion about what kind of education and what kind of development is sought after. There are many different forms of education and many different notions of what development is and these ideas need to be made explicit. For anyone believing that education is a key for development it is crucial to analyze the relation between different ideas on what development is and what kind of education is needed for that particular kind of development.

In relation to the themes of this thesis – e-learning, development and learning practices – it is important to understand the relationship between development theory, learning theory, educational practices and ICT. For this reason different development theories will be reviewed and connected to the context of ICT4D. Thereafter, e-learning and related pedagogical models will be discussed.
4.1 Theories of Development

The notion of development is controversial, complex and political (Sundén & Wicander, 2007) and has frequently been questioned and scrutinized during the last decades. The definitions are “based on the interests of different groups in the world” (Mchombu, 2004, p. 15) and mean contrasting things for different people (Unwin, 2009). The terminology used for developing countries (i.e., the objects of development) has changed over the years. Historically (from the 19th century to the 1940s) terms to describe developing countries and regions have been “primitive”, ”backward”, ”undeveloped”, “colonies” and ”territories” (most of these countries having been under political control of Europe). Less condescending terms emerged after World War II when these countries were described as ”underdeveloped”, “less developed” or “developing” – the last term at least indicating that it is not a permanent condition (Barke & O’Hare, 1991). Other common terms used are “north - south”, “the third world”, “least developed countries”, “transitional countries” and “emerging economies”. No matter which terms are used they are all based on a notion that we can classify a country in a more or less developed state. This categorical, and evolutionary, notion of development is what we are most used to envision. This notion is, however, not without criticism and this chapter will review different development theories based on a dichotomization made between traditional and alternative theories, and also discuss the role of ICT4D in relation to each strand.

Traditional Development Theories

The traditional development theories mainly stem from the so called “West” (Europe and later USA and Australia), and have their roots in the expansion of Europe from the mercantile phase to the industrial phase and later the information phase. The main idea is that the West is more advanced than the rest of the world and for development to occur the methods of the West should be copied. The countries of the West are considered to be in a better position because they have managed to expand (via colonies and advanced technology) and because they, via different economic systems, have become richer than the other parts of the world (Peet, 1999). The West is thus the role model and for development to take place people in developing countries need to change their ways and attitudes (Mchombu, 2004).

There are two major ideas at play in traditional development theories: one is that of evolutionism and the second is that of modern market systems. The evolutionary ideas of development imply that societies evolve from primitive to more
mature societies, and people from barbarians to civilians. Science and technology are seen as drivers of this evolution (Peet, 1999) and it is therefore "no coincidence that ICT4D emerged as a distinctive field of practice in the latter part of the 20th century at a time when the dominant mode of development discourse was associated with notions of economic growth and liberal democracy" (Unwin, 2009, p. 10).

The dominating economic theories are grounded in liberalism as it emerged during the Enlightenment (Peet, 1999; Unwin, 2009). In 1776 Adam Smith laid the foundation of free market economies based on three main ideas: the division of labour (specialization), the pursuit of self interest (selfishness as an economic drive) and freedom of trade. Market economy should not be regulated by the state but by an “invisible hand”, which means that the individual in maximising his own revenue also maximizes the revenue for the society as a whole (Peet, 1999). These liberal economic theories were slightly altered after the depression in the 1930’s (after which it was believed that governments under certain circumstances were allowed to intervene in the economy), but later also revived during the 1960’s in what is referred to as Neo-liberalism. Neo-liberalism is basically built on the same ideas as those of the Enlightenment and has dominated the development agenda for quite some time now (Peet, 1999; Unwin, 2009).

Other traditional development theories stem from Marxism. Marxism has something of a separate role between the traditional development theories and the alternatives. It is alternative since it is not based on the capitalist principles and because it brings inequalities between classes and gender into focus. But it is sharing with the traditional theories the same assumptions about the potential of science and technologies for development and also the “one-solution-for-all”-idea. Variations of countries and population groups are ignored and inhabitants of developing countries are treated as homogeneous entities (Schuurman, 2000). The evolutionary ideas of development (that societies evolve from primitive to more mature societies) are also found in Marx’s historical descriptions on the progress of societies from feudalism to capitalism and finally communism (Peet, 1999).

Economic growth was the deal, whether in the capitalist or the Soviet model. In using measures such as GDP per capita as the objective for development the rich countries became the norm for development. It therefore followed that the economic and political methods used by the rich should be copied, and also that development could (and should) be planned and administered from developed countries (Peet, 1999).
In both models development was seen to be happening in stages (from traditional and immature to advanced), and believed to be generalizable in space and time. A final similarity, in relation to education, is how both the capitalist and Marxist educational systems have been used for ideological transmission and propaganda (e.g., Christian values or Communist ideals incorporated in the school curricula).

It should be mentioned that Marx’s ideas on the close relationship between knowledge and practice in learning to produce a collective consciousness have inspired many progressive educators. His ideas on learning for revolutionary practices were, however, early twisted by Leninists who thought this learning could be achieved through propaganda and revolutionary education. In a top-down manner the party was believed to be able to impose this ‘collective consciousness’ on the people through education (Morrow & Torres, 2002).

Alternative Development Theories
There are many so called post-development theories and they are all diverse, but with a mutual standpoint of criticism against the Western notions of development. They propose alternatives based on small-scaleness, cultural pluralism, decentralization and grass-root empowerment.

The theories of post- or antidevelopment showed how old colonies when gaining independence (in the nineteenth and twentieth centuries) were still economically dependent on their former colonizers and how this dependence has been preserved through indebtedness and trade barriers to allow for continued exploitation of these countries (Barke & O’Hare, 1991; Escobar, 1995). They describe how the motives for starting up a development agenda can be capitalist enterprises still in need for raw material (and later on cheap labour) from the new independent states of Africa and Asia. Much critical thinking about development emerged from the neo-Marxist thinkers from the late 1960’s to 1980’s (Peet, 1999). In their “dependency theory” they describe Europe’s advanced progress as a result of its brutal methods of conquering, killing and colonizing which in turn created a centre of power and wealth (Europe) with all other parts of the world in the periphery, highly dependent on the centre (Peet, 1999).

One of the most persevering critics of development, Escobar (1995), goes as far as to say that it is the Western development interventions that cause famines and debt crises. Escobar means that developing countries should be much better off if we had not intervened in the name of aid and development and keeps us responsible for multiplying underdevelopment by trying to erase poverty.
The critique of traditional development theories has otherwise mainly been concerned about how it has been a top-down process and how Western ideals are forced on developing countries with the underlying assumption that the best would be if these countries evolved into modern Western societies. Westernization was built on “the ethnocentric assumption that the traditional society should change to the modern one, that everyone should adopt the Western capitalist viewpoint, and that all people are acquisitive rational economic human beings” (Barke & O’Hare, 1991, p. 55). Traditional societies and indigenous practices are seen as irrelevant and given very little credit (Barke & O’Hare, 1991; Simon, 1997).

The Western and Marxist development theories all contained highly generalized ideas on systems for development. The theories were supposed to work as master-plans which could explain and predict development during any historic event, in any country and under any circumstances. During the late 1970’s and early 1980’s both Western and Marxist theories were increasingly challenged by theorists arguing that things change more unexpectedly and spontaneously in a very complex world (Peet, 1999; Schuurman, 2000). The philosophies underlying the Western structures were also those of human reason, logic and rational behaviour as the driving forces for social progress and development (Peet, 1999). The main problem with these theories, from a global perspective, is that this logic or reason is supposed to be the same for all people, all times and all circumstances. The Enlightenment’s ideas on rationality has been criticized for being culturally specific, i.e., European (Unwin, 2009). Foucault (1972) revealed that values such as autonomy, freedom and human rights are part of a discourse in order to decide the ‘truth’ about what can be said and thought about something (Peet, 1999).

From a feminist tradition these Western notions have also been contested based on the feminist epistemology. The Enlightenment’s notion of rationality is based on the man as the ideal where emotions and feelings were ascribed to be undesired, female, characteristics (Peet, 1999). The feminist tradition consists of many different strands, but with a mutual standpoint in a criticism of traditional development theories. The criticism is not only targeted at the total exclusion of women in the development agendas, but also at the dominant Western, capitalist view of development. Socialist feminists have built on and elaborated the ideas from Marx and added the reproduction (of human beings) as an equally important part of human existence as production (of material and goods). They have
also pointed to other inequalities than that of class that need to be addressed in development, such as gender, race and ethnicity (Peet, 1999). Feminist theorists have also, simply by including women into the analysis, pointed to other neglected areas of development such as the informal sector (i.e., labour neither taxed nor monitored by the government).

**Changing Measures of Development**

With rising criticism toward the Western notion of development, its measures of development have also been more frequently questioned. To use the measure economic growth (typically GDP per capita) as the most important measure of development is challenged:

“For the modern economist this is very difficult to understand. He is used to measuring the 'standard of living' by the amount of annual consumption, assuming all the time that a man who consumes more is 'better off' than a man who consumes less. A Buddhist economist would consider this approach excessively irrational: since consumption is merely a means to human well-being the aim should be to obtain the maximum of well-being with the minimum of consumption” (Schumacher, 1973, p. 61).

The Indian economist and Nobel Prize winner Amartya Sen was one of the first to criticize the use of GDP as a measure for development as he introduced the notion of *freedom* as a measure of development instead. Freedom is about having an influence on your own life and development is seen “as a process of expanding the real freedom that people enjoy” (Sen, 1999, p. 3). Sen sees freedom as both the means and ends for development and the main ‘freedoms’ in question are: political freedoms, economic facilities, social opportunities, transparency guarantees and protective security. Sen emphasises that it is important to have this broader view to development – including e.g., civic rights, education, the role of the media – in order to not only take measures in one field hoping that it would also lead to progress in other fields (Sen, 1999).

Social and welfare criteria (education, literacy, hunger, malnutrition, life expectancy, infant mortality, gender empowerment and so forth) have nowadays been included in United Nations development measure (Human Development).
“Human development is about much more than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interest” (UNDP, 2007, p. 19).

Additionally, criteria such as empowerment, freedom, control, quality of life and even happiness\(^\text{16}\) have been further elaborations of the development definition:

\[\text{[...]}\] “human development is the process of enhancing individual and collective quality of life in a manner that satisfy basic needs (as a minimum), is environmentally, socially and economically sustainable and is empowering in the sense that the people concerned have a substantial degree of control over the process through access to the means of accumulating social powers” (Simon, 1997, p. 185).

The perspective I take in this thesis is more in line with these new measures of development and, as will be discussed further below, the most suitable for the research field ICT4D. However, the connection between ICT interventions and development is hard to estimate (Johansson-Hedberg, 2007), and assessments become even more complicated when using measures such as empowerment. As soon as we move away from measures such as GDP per capita or exact poverty lines\(^\text{17}\) the ‘proof’ that any development is going on gets harder. And measures and proofs are often asked for:

“Once people have the idea schooled into them that values can be produced and measured, they tend to accept all kind of rankings. There is a scale for the development of nations, another for the intelligence of babies, and even progress toward peace can be calculated according to body counts. In a schooled world the road to happiness is paved with a consumer’s index” (Illich, 1971, p. 40).

Having said this, I believe that we more often need to explore the concept of development on an individual level, because “different users may value their use [of ICT] for specific individual reasons” (Johansson-Hedberg, 2007, p. 5). By talking

\(^{16}\) See for instance: The Centre for Bhutan Studies at http://www.grossnationalhappiness.com/Bibliographies/biblio_gnh.aspx?m=a

\(^{17}\) Where the line drawn is usually given in absolute economic terms on top of that - such as living on less than $2 a day, totally ignoring ‘relative poverty’ (Unwin, 2007).
to people we can find their individual stories about how ICT use can improve their lives. This has been my approach during this research and the relationship to development is here mainly defined in terms of what the students think and feel. For instance, if using ICT make students feel more in control of their lives, then following Sen (1999) one could argue that this is a measure of development.

4.1.1 The ‘D’ in ICT4D

ICT4D interventions are political processes (De’ & Ratan, 2009) and the view on development will affect the outcome of ICT4D interventions (Sein 2005). The same strands of development described above (traditional and alternative) are also found in ICT4D. Based on Hirschheim and Klein’s (1989) four paradigms on information systems development, Sein and Harindranth (Harindranth & Sein, 2007; Sein, 2005) describe four paradigms of ICT in development: functionalism, social relativism, radical structuralism and neo-humanism. They furthermore elaborate on the ICT view in each paradigm and also identify the main drivers and actors for each strand. Figure 10 illustrates the positioning of these paradigms.

The vertical arrow refers to the view of development and the horizontal to the view of ICT. To the left we find an objectivist view of technology (i.e., ICT is

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18 Sein’s choice to use the term “chaos” initially confused me since the term can have negative connotations. Sein has, however, explained that he did not intend to make it sound negative. Sein’s notion of chaos is that it is normal, that we are always in a state of chaos where we are constantly updating and changing our systems.
neutral and can be applied anywhere no matter the context) and to the right we find the subjectivist view of technology (i.e., ICT is not neutral and thus context sensitive). At the top of the horizontal arrow we find the modernization development perspective (’traditional’ in my wording) and at the bottom we find the alternative development perspective.

*Functionalism* is found where ICT is viewed as neutral and the modernisation agenda underpins the development initiative. Main drivers of the ICT4D initiatives are foreign donor agencies who send out ‘experts’ to fix things needed for development (e.g., Swedish companies building optic fibre in Africa, American teachers providing universities in developing countries with their courses and lectures).

*Social relativism* also has a modernization agenda for development, but with a situated view of ICT. This means that even though the main actors still come from a foreign country or donor agency, the host country is also represented (typically through a local NGO or university). This representation is needed because the foreign actors admit to uses of technology being context sensitive and that they do not have the knowledge of this context.

In *Radical structuralism* ICT is viewed as neutral, but actors within this strand do not believe in a fixed development state towards which initiatives should be targeted. People belonging to this strand oppose the evolutionary view of development and think that each country or region should take its own path to development. Main actors, or drivers, of development can come from both inside and outside the host country in the form of activists, revolutionaries or emancipators. ICT is viewed as a commodity (a tool, an asset, a product) so who created the ICT does not really matter. Nokia mobile phones can be used for mobilization against a regime, and blogs and wikis (web 2.0) on the web are seen as liberating tools.

*Neo-humanism* also belongs to the alternative perspective of development and includes a contextual, situated view of ICT. The main drivers of development are indigenous activists or academics aiming for emancipation. Locally produced software for local needs are promoted (e.g., Diaz Andrade & Urquhart, 2009), as well as south-south initiatives (such as Women’s Initiative for Peace in Nagaland and Sri Lanka).

Harindranath and Sein (2007) as well as Unwin (2009) claim that the traditional, modernisation, theories of development still pervade in ICT4D. It seems that our European understanding of development is still dominating; an understanding
that says that development is about liberal democracy and economic growth (Unwin, 2009). This understanding also builds on the assumption that foreign experts from donor agencies are needed for development and modernization to take place (Harindranth & Sein, 2007). The reason why the traditional, modernisation, theory of development still pervades can also be explained by the fact that development for long has only been seen as poverty elimination where poverty mainly is measured in economic terms (Unwin, 2009). Many actors in ICT4D are, however, moving away from traditional theories of development and contest the measuring of development solely in economic terms. The field is increasingly inspired by new development measures such as quality of life, human development and freedom to make choices in your own life. The perspective of human development, or “people-centred development” (Mchombu, 2004), is today said to be the most appropriate for studying the role of ICT in development (Sein & Harindranth, 2004) and to be more in line with the research field of ICT4D:

“Understanding precisely how ICTs can make a difference to the lives of the poor and marginalised does indeed in part depend on economic growth, but it is also concerned with issues to do with the access that people have to information, about the ways in which those from different backgrounds communicate with each other, and about the content requirements that poor need if they are to be able to transform their lives and livelihoods. Above all, [... it] is about the ways in which new ICTs can contribute to these processes” (Unwin, 2009, p. 1).

In this thesis I take the perspective that ICT4D should be understood in this way, and that ”access to information is a process for building self-reliance, empowerment, civil society, participation and gender equality” (Mchombu, 2004, p. 19).

4.2 Education and Development

“The conception of education as a social process and function has no definite meaning until we define the kind of society we have in mind” (Dewey, 1916, p. 112).

Education is consistently said to be one of the most important factors for development (UNESCO, 2005; World Bank, 2010) and the interest in using ICT for dissemination of education is growing. Education and ICT are thus important, but important for what kind of development? As was shown above, different paradigms on development build on certain underlying beliefs and the very same
beliefs also dictate how education should be designed. It is this relation that needs to be taken into consideration before we talk about “Education for All” or start up educational projects in the name of aid and development.

If abiding to traditional development theories, building on the idea that there is one role model (usually the West), then education should be designed and delivered according to these standards. If West is the norm then West’s forms of education and content of education (including Western values and beliefs) should be imitated and copied. Through imitation and copying the current world order is strengthened and education is used as a tool for this (Ezer, 2006).

When discussing traditional development theories in relation to education we also need to be aware that these theories have a historic legacy. To take an example from the colonial days, we find the words of Thomas Babington Macaulay, a 19th century British politician in India, to well demonstrate the ideas of Western supremacy in education:

“I have read translations of the most celebrated Arabic and Sanscrit works. I have conversed both here and at home with men distinguished by their proficiency in the Eastern tongues. I am quite ready to take the Oriental learning at the valuation of the Orientalists themselves. I have never found one among them who could deny that a single shelf of a good European library was worth the whole native literature of India and Arabia. The intrinsic superiority of the Western literature is, indeed, fully admitted by those members of the Committee who support the Oriental plan of education” (Macaulay, 1835, para 4).

Colonial education was mainly used as a tool for making colonial rule easier by making the colonized people conform to the culture and traditions of the colonizers (Altbach & Kelly, 1978; Viswanathan, 1997). Another agenda was to convert the ‘heathens’ to Christianity. Most education aimed at development was conducted by Christian missionaries, which then enabled a cultural and religious imperialism intertwined. The rationality and logic of the West should be adopted at the same time as the subjects’ religious beliefs would be “perfected through Christianity at the end of their so-called ‘evolution’” (Bellenoit, 2007, p. 371). This “normative chauvinism”, building on the idea that the evaluator’s culture is right and the other inferior, was closely linked to the aims of religious missionaries (Nussbaum, 1997, pp. 131–133).
The heritage from the colonial time is still visible in most developing countries, such as Bangladesh and Sri Lanka, where the education systems derive from the British one. Where Sri Lankan students before the time of colonization went for temple studies they still today, over 60 years after independence, go to classrooms and take their O and A levels according to the British system. Just as Ezer (2006) points out in his study on ICT educations in India, the country inherited the British educational system which was created to support British administration and not to challenge authority. The education system was thus built to educate students to administer an existing system instead of changing or creating one.

The ideas behind traditional development are also visible in how education is designed and delivered in present time. With the introduction of modern ICT and increased globalization the Western impact is probably even higher than during the colonial era. Most Internet based educations come with inherited Western values. The majority of Learning Management Systems are American products (Wright, Dhanarajan, & Reju, 2009) and English language content is dominating the Internet (Diaz Andrade & Urquhart, 2009). This “cultural imperialism of courseware from Western nations” (Wright et al., 2009, para 1) not only makes the content based on Western problems and issues, but the design is also Western. The lack of localized content and design in e-learning educations has proven to be a challenge for many students in developing countries (Friesner & Hart, 2004; Hatakka, 2009; Reeves & Reeves, 1997; Selinger, 2009): “Attempts to import courses from abroad have not worked out in Asian LDCs [Least Developed Countries] because of language, culture, and other differences from the local environment” (Eastmond, 2000, p. 102).

Another colonial legacy is seen in how strong the intellectual dependency in most developing countries is. Intellectuals of the old colonies have been trained according to the Western research agenda thereby incorporating the methods and philosophies of science of the West. Researchers of the West usually also have monopoly on the raw data of the colonized countries (through research funds and better opportunities to get published in highly reputed journals) making the third world dependent on West for information about themselves (Peet, 1999).

The colonial ideas of conforming the others and that knowledge is objective also have implications for what kind of pedagogy is proposed. Teaching practices are built on the idea to stream-line students through a traditional education built on a “one-way transmission of content” (Garrison & Anderson, 2003, p. 3). In this kind of setting the teacher’s role is to regulate how the world enters into the mind
of the individuals and the students are seen as patiently listening objects (Freire, 1970). This kind of teaching builds on the idea that knowledge is information and that “information is a product delivered to the student” (Ramsden, 2003, p. 147).

These ideas of being able to transmit knowledge echo back to behaviouristic learning theories, but in relation to development theories we additionally find the idea of imitating a specific role model. Whereas a behaviourist theorist is only interested in how one learns (no matter what the learning is), people abiding to traditional development theories make explicit exactly what should be learned (i.e., the successful practices of the developed countries). Traditional education is also often authoritarian where predetermined knowledge is delivered through lectures where the teacher is seen as the source of undistorted information (Dewey, 1916; Ramsden, 2003):

> “With its large lecture halls and standardized, objective testing, traditional undergraduate education has taken on an industrial character. Fundamentally, lecturing is about imparting information not about understanding ideas” (Garrison & Anderson, 2003, p. 3).

### 4.2.1 Social Change Education

People opposing the traditional development theories not only oppose their definitions of development, but also their educational methods. Amartya Sen (1999) defined development as the extent to which people have control over their own lives. When he talks about equal right to education he draws on the notion of freedom by seeing education as an enabler to live the life you chose, as well as the human development measure where education is an enabler for people to develop their full potential and lead productive, creative lives. In a speech at the Commonwealth education conference Sen (2003) argues for the need of basic education due to its opportunity to give people choices. Note that he is not talking about economic growth, but about choices and securities:

> “The most basic issue relates to the elementary fact that illiteracy and innumeracy are forms of insecurity in themselves. Not to be able to read or write or count or communicate is a tremendous deprivation. The extreme case of insecurity is the certainty of deprivation, and the absence of any chance of avoiding that fate” (Sen, 2003, para 5).
Instead of streamlining education, critical development thinkers point to the need for variety in education by taking different kind of cultures and different kind of students into account: “There must be a large variety of shared undertakings and experiences. Otherwise, the influences which educate some into masters, educate others into slaves” (Dewey, 1916, pp. 97–98). Education from this perspective aims at social transformation and is often referred to as social change education or critical pedagogy where “the common denominator is that the pedagogy is employed as a tool for engaging people to transform unjust social, economic, and political conditions” (Choules, 2007, p. 160).

In order to define what education can mean for development I have been much inspired by the revolutionary ideas of Paulo Freire (1970) – and I do not mean revolutionary in the Marxist or communist sense that many have associated him with. I read Freire in a different way; what his pedagogy aims at is the empowerment of marginalized groups. Freire’s educational ideas are interesting in a development context not because of any political views but because of the underlying concern with social change. Freire aimed for what he called an “authentic democratization” where the goal “is not a particular ideological perspective but the formation of a more general capacity for critical thinking” (Morrow & Torres, 2002, p. 133). In “Pedagogy of the oppressed” (Freire, 1970) he argues for a humanist or libertarian pedagogy where communication and critical thinking are the central concepts:

“Yet only through communication can human life hold meaning, the teachers thinking is authenticated only by the authenticity of the students thinking. The teacher cannot think for the students, nor can she impose her thought on them. Authentic thinking, thinking that is concerned about reality, does not take place in ivory tower isolation, but only in communication” (Freire, 1970, p. 77).

Freire opposes the traditional educational setting which he describes to have a narrative character where the teacher is a narrating subject and where students mechanically record and memorize repeated phrases, restricted to receiving and storing spoon-fed information. Freire’s mission is to expose social and political contradictions in order to remove the power of oppressors (Freire, 1970) and his thoughts are therefore highly relevant for countries where inhabitants have been oppressed by colonizers or the own government.
Freire’s pedagogy has two stages: 1) the oppressed unveil the oppressed world (through ideology critique) and through praxis commit themselves to transforming it, and 2) in the transformed world the pedagogy stops belonging to the oppressors and becomes the pedagogy of all the people in the process of permanent liberation (Freire, 1970, p. 54). For this to be possible the education needs to move towards a more humanistic and liberating pedagogy based on communication. Through communication and dialogue the teachers not only educate the oppressed but are also educated by them and teaching methods can thus no longer be used to manipulate the students. Freire’s idea is that the classroom should work as a centre for participation where the students and teachers dialogue together to change or challenge the structures that constitute oppression, inequality and regression (Maralee, 1998). Closely related to Freire’s ideas are those of constructivism:

“Constructivism is a philosophy of learning based on the premise that knowledge is constructed by the individual through his or her interactions with the environment. It has its roots in the constructivist movement of cognitive psychology, which holds that individuals gradually build their own understanding of the world through experience, maturation, and interaction with the environment, to include other individuals. Thus, from the constructivist viewpoint, the learner is an active processor of information. This is in sharp contrast to behaviorism, for example, in which the learner is viewed as a passive recipient of information” (Rovai, 2004, p. 80).

Dewey, one of the philosophical founders of constructivism, pinpointed two major pillars for education: continuity and interaction (Dewey, 1916). Continuity refers to the experiences of students which influence all learning; students learn from every experience and every experience thus affects all future experiences. Interaction refers to how these past experiences interact with the learning at hand, which then makes any learning experience individual. The importance of understanding the students’ experiences of learning is also stressed by Ramsden (Ramsden, 2003) who argues that “differences in the quality of learning are due to differences in the ways that students go about learning; and these differences can in turn be explained in terms of their experiences of teaching” (Ramsden, 2003, p. 20).

In my later studies I have also asked students about both their past and present learning practices because I believe that previous learning experiences influence
the present. Depending on these previous learning practices, the adoption of new approaches to learning will therefore be varyingly challenging. It is hard to separate how students learn at the time of investigation (whether at university or in an e-learning course) from the students previous learning experiences because students’ approaches to learning are very much influenced by these previous experiences of learning (Dewey, 1916; Ramsden, 2003). Students simply carry these experiences with them throughout the years – strong relations have been shown between how students approach learning in the secondary school and how they approach learning at university (Crawford, Gordon, Nicholas, & Prosser, 1998). All in all this calls for flexibility and individuality in learning designs in order to allow for individual differences. Furthermore, contextualization and interaction are stressed for constructivist learning (Ally, 2008).

Due to my focus on how learning is related to development I will now continue by exploring the constructivist ideas of critical thinking and learning how to learn.

The Importance of Being Critical

Critical thinking is something most higher education institutions are said to value and foster. The idea of critical thinking as a desirable learning outcome is not new. Indian logic and critical thinking have roots going back some two thousand years (Hongladarom, 1998; Kak, 2005) and the “Socratic argument” dates back to classical Greece (Nussbaum, 1997).

The term critical thinking is, however, often used in rather futile general statements stating its importance without any problemization of what it is and how we achieve it. Definitions give at hand that it is a **disciplined mental process of skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating arguments or propositions and making judgments that guide beliefs and actions** (Huitt, 1998, para 15; Scriven & Paul, 2009, para 1). Critical thinking is about making reflective judgments about what to believe by having “the ability to synthesize arguments and evidence from multiple sources, sources that often disagree” (Light, 2001, p. 37).

According to Lipman (1988) critical thinking is thinking based on some criteria and which then, consequently, can be assessed by criteria. The difference between ordinary thinking and critical thinking can be to **prefer** a book for a course and to **evaluate** a book’s appropriateness for a course (based on some criteria such as course goals), or to offer opinions **without reasons** and offer opinions **with reasons**. Critical thinking is thus thinking that makes use of criteria. Critical thinking is furthermore self-correcting in the sense that it is open for evaluation of
weaknesses in reasoning – to admit that something did not work out as planned and to correct the approach is by itself critical thinking. This requires you to reflect on your thinking, to do some meta-thinking.

Finally Lipman points to the fact that critical thinking is sensitive to context. Thinking that takes the context into consideration also takes into account e.g., the number of informants that conclusions are drawn upon, the discourse that taken-for-granted facts stem from and that meaning differs between different cultures and persons. Concepts such as rationality, fairness – or why not development – have different meaning depending on the context. The outcome of this kind of critical thinking is good judgement: “[w]e want students to think for themselves and not merely to learn what other people have thought. […] it is equally important that they exercise good judgement” (Lipman, 1988, p. 43).

Critical thinking is thus about thinking about why you think the way you think. This in turn enables students to apply facts, skills, and knowledge to new situations which is needed for life-long learning. Critical thinking is the opposite of the parrot-like repetition of something read or heard (as when students rattle off the facts in an exam before they forget) or the simple use of skills acquired without contemplating what you do and what consequences this doing leads to. Critical thinking is seen as fundamental for constructive e-learning and requires social interaction in a community of inquiry (Garrison & Anderson, 2003; Rovai, 2000).

The Importance of Learning to Learn
If abiding to a constructivist view on learning, where knowledge is seen to be created and re-created based on experience and interaction, the main focus of learning must be to facilitate knowledge creation:

“Since growth is the characteristic of life, education is all one with growing; it has no end beyond itself. The criterion of the value of school education is the extent in which it creates a desire for continued growth and supplies means for making the desire effective in fact” (Dewey, 1916, p. 62).

The generic skills on how to learn, how to capture an ever changing body of knowledge, must therefore be more important than isolated measures of specific learning outcomes: “[L]earning is best conceptualized as a change in the way in which people understand the world around them, rather than as a quantitative
accretion of facts and procedures” (Ramsden, 2003, p. 79). Learning to learn is thus not seen just as a means for passing the exams or learning whatever students are learning during the particular courses, but an end in its own right. It is for this reason that I decided to focus on learning practices in this research.

Developing capabilities for learning is furthermore important because learning does not only take place in schools or under a certain course delivery. Students acquire their knowledge through work, in playing games, or anywhere else outside of school (Dewey, 1916; Freire, 1970; Illich, 1971). Learning how to learn, or life-long learning, requires that students develop skills of inquiry and independent learning (Ramsden, 2003) and that they take responsibility of the learning (Garrison & Anderson, 2003). An effective learner thus needs to have the skills for critical thinking, individual exploring and collaboration with others. This requires the student to be curious, questioning, imaginative, but also sceptical, critical and analytical (Claxton, 2007, p. 3).

If we add the features of Internet with all its information flow, learning how to learn in terms of having the skills of information literacy is even more apparent. Educators have found that for students to manage this “overwhelming breadth and depth of information [...] the only long-term solution was to construct an educational environment in which students would not only learn, but where they would learn to learn” (Garrison & Anderson, 2003, p. 12).

“It has become very clear that the value-add in a ‘knowledge-based future’ will be a learning environment that develops and encourages the ability to think and learn both independently and collaboratively. That is, critical and self-directed learners with the motivation and ability to be both reflective and collaborative and, ultimately, with the motivation to continue to learn throughout their lives” (Garrison & Anderson, 2003, p. 20).

4.2.2 Constructive Learning Practices and Development

Dewey (1916) saw constructivist education as a tool for enabling students to become active and efficient members of a democratic society. He opposed the authoritarian transmission model of education because he believed it to undermine an equal society. In referring back to the major focus of education – students’ experiences and interaction – he makes the connection to a democratic society:
“A democracy is more than a form of government; it is primarily a mode of associated living, of conjoint communicated experience. The extension in space of the number of individuals who participate in an interest so that each has to refer his own actions to that of others, and to consider the action of others to give point and direction to his own, is equivalent to the breaking down of those barriers of class, race, and national territory which kept men from perceiving the full import of their activity” (Dewey, 1916, p. 101).

In addition, Freire (1970) believed that liberal, humanist education could make students aware of social realities and thereby able to contribute to progressive changes in society. Whereas traditional education does not enable students to act or change the world – because students are merely seen as being in the world as spectators – critical education can make them re-creators of the world. Freire’s so called critical pedagogy also has connections to Habermas and his critical theory. Habermas shares many conceptions with Dewey and Freire on the criticism of traditional education and desired pedagogical practices (Morrow & Torres, 2002). They all believe that authoritarian and uncritical schooling can lead to fascism and dogmatism. Sen (2003) warns how ‘illiberal and intolerant education’ limits the horizons of students and contributes to political insecurity, whereas Habermas and Freire both regarded authoritarian education as one of the main reasons for failed democratic societies and fascist regimes. In hierarchical and authoritarian educations students are schooled to be political dopes not able to mobilize against, or resist, fascist forces (Morrow & Torres, 2002):

“Habermas and Freire converged in viewing the failures of their societies of birth as the outcome of interweaving processes: the relationships among authoritarian educational institutions, one-sided strategies of technical modernization guided by the priorities of capital accumulation at the expense of human needs, and resulting failures of democratization culminating in authoritarian, fascist regimes” (Morrow & Torres, 2002, p. 10).

To avoid these dangerous consequences of education students need to be “exposed to ideas from many different backgrounds and perspectives” (Sen, 2003) because awareness of cultural differences is essential for respect and dialogue (Nussbaum, 1997). Nussbaum (1997) argues for “an education that is ‘liberal’ in that it liberates the mind from bondage of habit and custom, producing people
who can function with sensitivity and alertness as citizens of the whole world” (Nussbaum, 1997, p. 8). She is worried about how limited the education at many universities is and how American universities have very little information about Hinduism, Islam or Indian and African history (and even less about the developing world). She believes that the mission of higher education is to cultivate humanity, to “educate people who can operate as world citizens with sensitivity and understanding” (Nussbaum, 1997, p. 52). Cultivating your humanity requires: the capacity for critical examination of oneself and one’s traditions; the ability to see oneself not simply as citizens of some local region or group, but as human beings bound to all other human beings, and; an ability to think what it might be like to be in the shoes of a person different from oneself (in the context of that person’s history and social world).

“It would be catastrophic to become a nation of technically competent people who have lost the ability to think critically, to examine themselves, and to respect the humanity and diversity of others” (Nussbaum, 1997, p. 300).

Critical thinking is thus a vital ingredient for development. Development is per definition about change and about doing things in a different way so that change is possible. In order for changes to happen we need to dispute assumptions, question the current situation and investigate alternatives.

Learning to learn is also essential for development (Selingker, 2009) because development is an ongoing process that needs continuous and collective learning. Habermas, while not directly addressing education, argues for collective learning which he believes is a generic skill that societies need to be able to meet new challenges (Morrow & Torres, 2002, p. 137). For development to take place we thus need to learn how to learn in a collaborative way:

“The self-directed learner is one whose skills in learning, having learnt how to learn, reassure her of economic, social, and cultural survival in this fast changing world of ours, and whose control over her learning ensures her control on her life” (Wain, 2006, p. 41).

To summarize; authoritarian, uncritical education is detrimental for development (development in the meaning of freedom, quality of life and the fight against oppressive social conditions). Moves towards constructivist learning involve the questioning of authorities and truths (Freire, 1970; Sen, 2003) which in turn
generate responsible, ethical citizens (Dewey, 1916). In this view of development the learning practices of students take a very central role and, as e-learning becomes more widespread, researchers within ICT4D also affirms this:

“There is international consensus that for education to be successful, learning should be an active process that involves collaboration, problem solving and critical thinking with mentor support from teachers. This is in preference to the behaviourist model of learning that is believed to persist in so many countries in which teachers are transmitters of knowledge and students are passive receivers” (Selinger, 2009, pp. 220–221).

Having now discussed development in relation to education, I will now sum up this discussion by exploring ICT4D’s possible roles for education.

4.3 ICT4D and Education

Both traditional and alternative development theories are shaping ICT-based educational interventions for development. If people abide to the traditional theories of economic growth and West as a role model, the role for ICT4D in education will be based on education models that copy the education systems of the West. These ideas belong to what Sein would call the “Functionalist development paradigm” (Sein, 2005). In order for development to take place, people need to become more ‘Western’ and since Western courses bring Western values (Wright et al., 2009) the same courses and platforms used in the West should be employed. In some cases, and possible approaches for the ”social relativist paradigm” (Sein, 2005), localization of Western designs are done by using local examples for instance. This can be very helpful, but often we find that the contextualization boils down to replacing cars with rickshaws, or apples with yams, in examples used in Maths or Physics books.

In other cases it is the western way of teaching, the pedagogy, which is copied. Here we not only find pedagogies based on the idea to conform students through a one-way transmission of content that was earlier described. The ideas of critical thinking and constructivism also have Western origins (whether traced to Socrates’s Greece or Dewey’s America) and can thus be role models as well.

Additionally, due to the belief of universal economic growth, educational initiatives are designed to prepare developing countries for a globalized world and focus is on skills that will facilitate this participation.

The role for ICT4D in this paradigm is thus to help students in developing countries become more Western in order to achieve economic growth. The role of
ICT in development can thus be to increase outreach of education which can make educational opportunities more equal. The role can also be to create new possibilities for interaction, transaction and information access which can enable people to take part in a globalized world. In the long run ICT can in this way contribute to development in the sense of national economic growth by doing business in new ways, or by enabling participation (and competition) in a global world. The keys for this societal change are access to ICT and human capacity building for entrance into a global economy. Education is in this sense used to meet the demands of a current, global, labour market—“not one that seeks local solutions to local problems” (Ezer, 2006, p. 207).

For the other, alternative, strand in ICT4D, if abiding to a “Neo-humanist paradigm” (Sein, 2005), ICT could be used as a tool to support indigenous knowledge and learning practices. Technical applications and content should be locally produced and self-directed. From this strand, and also advocated in the “Radical structuralist” paradigm (Sein, 2005), the pedagogy proposed should be emancipatory and encourage communication and critical thinking. Specific learning outcomes are not as important as learning how to learn—through critical thinking prevailing truths can be questioned and new truths can emerge. In this way students in developing countries can set their own agenda regarding goals of development, ways to get there and consequently how education should be designed.

The possible role for ICT, within this paradigm, is also to increase outreach, and create new possibilities for interaction, transaction and information access. The overall role for ICT4D is however targeted towards another kind of development. ICT in education should not only be used as a tool to copy the West. By acknowledging local needs and contexts, the education can be tailored more towards human capabilities instead of streamlining students towards an existing global industry’s needs (Ezer, 2006). If copying of practices should be done then the ‘the copying’ should work in all directions in order for us to not have narrowness thrown upon our children (Sen, 2003). In that way, critical thinking and constructive learning practices can put students in a position where they can make informed choices.

The idea is also that ICT can be used to change the inhibiting educational structures that restrict people choices and possibilities to develop their full potential:
“Education is not just about making sure that the citizens of a country are able to compete on an equal footing with the rest of the world. It is also about helping new generations to understand the context of their own cultural and social traditions […]” (Selinger, 2009, p. 213).

Within the alternative strand it is believed that a changed pedagogical culture, a change towards a constructivist learning environment, will lead to social and human development. Keys for this societal change are access to ICT and a change of the educational structures in order to allow for an open and critical evaluation of development (its goal and practices).

Table 6 below summarizes the two strands of development theories in relation to educational approaches, as well as alternative paths for ICT4D in relation to these findings.

Table 6: Summarizing development theories’ relation to education and ICT4D

<table>
<thead>
<tr>
<th>Development assumptions</th>
<th>Educational approaches</th>
<th>Possible roles for ICT4D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods of West (or any other role model) should be copied</td>
<td>Heritage: Colonial and missionary education</td>
<td>Outreach of education, Education for all</td>
</tr>
<tr>
<td>Existing world order should be strengthen</td>
<td>Western values and beliefs should be imitated and copied (whether behaviouristic or constructivist learning is promoted)</td>
<td>Help to be developed in a Western sense</td>
</tr>
<tr>
<td>Development from above</td>
<td>Internet based educations with inherited Western values can/should be exported</td>
<td>Make educational opportunities equal</td>
</tr>
<tr>
<td>Development can be generalized in space and time</td>
<td>Western Learning Management Systems can/should be used</td>
<td>Prepare for a globalized world</td>
</tr>
<tr>
<td>Development can be planned and administered from developed countries</td>
<td></td>
<td>Technical skills that facilitate participation in the contemporary world</td>
</tr>
<tr>
<td>An evolutionary view on development</td>
<td></td>
<td>Localization of (Western) content and design</td>
</tr>
<tr>
<td>Development = economic growth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

107
In summation, underlying beliefs about development are related to different educational ideals. By connecting different theories of development to the education promoted within each paradigm this section has discussed how traditional theories of development have a focus on copying and imitating the education of the West. The aim with education is thus to shape students to the Western, economically successful, ways of thinking. The alternative theories on development, on the other hand, promote educations where learning methods and technologies are indigenously designed and often with the aim of becoming aware of oppressive and restrictive forces in society.

Within the research field of ICT4D there are many different views on what development is and the educational initiatives undertaken will therefore vary. Depending on which kind of education is promoted it will also reflect a view on what development is – and then, in return, affect what kind of development takes place. No matter which development perspective researchers, governments or development agencies have, we should make informed and transparent choices for the reason of not believing that any education initiative by default leads to the kind of development desired. Some people say that technologies are just tools, but even if that is so we should at least be aware of what we are building.
Before discussing the overall research question (if the use of ICT in distance education can contribute to development) I will provide a brief summary of the results of each paper. Figure 11 shows a sketch over how the individual papers are related:

**Figure 11: Sketch over how individual papers are related to the overall research strategy**
5.1 Results of the Individual Papers

The main results of the individual papers are presented below, as well as a description of how the result of each study fed into the next.

**Paper I. A Conceptual Framework for e-Learning in Developing Countries: A Critical Review of Researched Challenges**

The first paper reflects the starting point of my first research questions and endeavours. I wanted to believe, as so many of us, that e-learning could be a solution for education in developing countries where teachers are scarce and where most people live in far-away rural areas. I had, however, come across statistics showing that drop-out rates from e-learning courses are much higher than those from traditional classroom or campus based courses. I therefore wanted to find out why this was so. In a rather instrumental way I wanted to find out what the challenges were in order to know what to fix.

The paper reports the findings of a review of research on challenges for e-learning with particular focus on developing countries. A literature study including 60 papers on e-learning challenges was done for the purpose of understanding how to implement e-learning in developing countries. I wanted to find out what major challenges previous research had identified and also if there were different challenges for e-learning in developing countries and developed countries.

The research in this paper was interpretative and generated a conceptual framework of emerging issues for e-learning in developing countries. The framework consists of 30 specific challenges which belong to four broad categories related to courses, individuals, technology and context. The factors were further examined to see which, if any, factors were of specific importance for developing countries.

The results of the study were:

- An understanding of the complexity and magnitude of e-learning challenges. This provided the research with a fundamental perspective of the necessity to consider wider systems of institutions and actors in which the phenomenon under study (in this case the e-learning course) takes place. E-learning is a complex system of e.g., technical, individual, social components and for it to be best designed there needs to be a balance between all important components. The result from this literature study was used as a sensitizing device for the upcoming empirical work.
It was found that most factors are universal, but interestingly not used universally. Existing research and frameworks on e-learning have different focus depending on which country is addressed. Contextual factors (typically culture) are investigated in poorer countries and individual characteristics of the student are investigated in richer countries. The results of this literature study, however, concluded that exclusively looking at one category or issue when discussing e-learning is not enough and that all generated challenges are relevant to examine regardless of the socioeconomic setting. Based on this understanding, and trying not to enforce this bias, an open approach was thereafter taken in coding all the empirical work.

Paper II. Seven Major Challenges for e-Learning in Developing Countries: Case Study eBIT, Sri Lanka
In the second paper the conceptual framework developed in the first paper was applied to an empirical case. The framework was used as a tool for designing the data collection and analysis in order to assess which of the challenges were most salient for an e-learning course in Sri Lanka. The study included 1887 informants with data collected from year 2004 to 2007, covering opinions of students and staff. A quantitative approach was taken to identify the most important factors followed by a qualitative analysis to explain why and how they are important.

The results of the study were:

- An identification of seven major challenges in the following areas: Student support, Flexibility, Teaching and Learning Activities, Access, Academic confidence, Localization, and Attitudes.
- A qualitative analysis of the meaning of these challenges and how these challenges had been dealt with (i.e., some solutions) in this particular case.

Paper III. Letters from the Field: e-Learning Students Change of Learning Behaviour in Sri Lanka and Bangladesh
The first literature study on challenges for e-learning (paper I) revealed that research on e-learning in developing countries had a major focus on technology and contextual factors (such as culture, traditions, rules and regulations), whereas the

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19 The framework used at that time consisted of 37 e-learning challenges (as opposed to 30 in the first paper of this thesis) before a revision and elaboration of the first paper was made. If interested please compare with (Andersson, 2007).
very learning seemed to be somewhat forgotten. In applying this framework to an empirical case (paper II) I, however, found that at least four of the seven major challenges experienced were related to learning. This third study was thus a response to these findings where I asked students to openly comment on what they found most challenging in learning in ICT supported distance mode.

An open approach was taken in collecting and analysing the empirical material. The data was collected by using the simple but, as it turned out, very rewarding method to a) openly ask the question on what students felt was the hardest in studying in distance mode, and b) allowing students to freely write down the answers for me. Visits to learning centres in Sri Lanka and Bangladesh were made during 2007 and 2008 and 122 student responses were analyzed. Whereas technology and access were still major concerns for these students, more strikingly they wrote most about how hard it is to know how to learn. The introduction of e-learning and a constructivist learning model involved a drastic shift for these students that had been brought up in very teacher-centred didactic educational cultures.

The results of the study were:

- An empirically close description of which challenges e-learning students perceive in both Bangladesh and Sri Lanka.
- The realization that the change in how students are supposed to learn is the major challenge for them. The students in the two cases are unanimous in mentioning the pedagogical changes as their major challenge in studying in distance mode. These students have grown up in an educational setting where the norm is that the teacher is the expert that teaches and that the students should ‘listen and learn’. Now they were faced with a new e-learning agenda where students are supposed to be highly autonomous in their learning. To manage this transition much support is needed for both teachers and students, and some suggestions on what this support could include were also given.

**Paper IV. Increasing Interactivity in Distance Educations: Case Studies Bangladesh and Sri Lanka**

Due to the findings in the previous study two ideas emerged. One was to investigate how the students could be assisted by technology for some interaction. The other was to take the pedagogical shift seriously by considering how the described differences in learning could be analysed and understood. The idea came to test the explanatory power of Structuration Theory by seeing students’ learning
activities as something that takes place within an educational (or pedagogical) structure.

The paper thus explored both how distance educations in developing countries can enhance interactivity by means of ICT, as well as the usefulness of Structuration Theory. Based on the two case studies in Bangladesh and Sri Lanka I traced technological implementations and changes over time and analyzed which norms and beliefs emerged as a result of these changes. The educational structures I contrasted the findings against were a so-called ‘traditional transmission of knowledge’-structure and an ‘interactive creation of knowledge’-structure.

The results of the study were:

- Findings from both cases showed the concurrent enactment of both the transmission and the interactive structure. Whereas peer collaboration and the use of self-assessment tools made students take more ownership of their learning, I also found the idea of a classroom with an instructive teacher to be deeply rooted in the students’ minds. The concurrent enactment of both structures showed that long-established practices are not transformed overnight. It was also found that different norms and beliefs can coexist at the same time and during the same course delivery.

- Another finding was that the interactive activities were enabled by very different technologies.

- The use of Structuration Theory for the analysis was very fruitful. By tracking structuration processes over time I was able to identify even small changes to the students’ mindsets. Additionally, by using Structuration Theory’s modalities as analytical tools I was able to identify many conflicting norms and interpretative schemes that could otherwise have been easily misunderstood. Using Structuration Theory directly to the data analysis yielded a more nuanced and rich understanding of what can happen when introducing technology to distance educations.

Paper V. Learning e-Learning: The Restructuring of Students’ Beliefs and Assumptions about Learning

In realizing the potential of using Structuration Theory and still focused on the clash of pedagogical structures, the exploration of how students learn continued.

The fifth paper built solely on the Sri Lankan case and targeted students underlying beliefs about learning. I wanted to find out if, and how, the e-learning practice manages to transform students into more constructivist learners (as expected in the e-learning design). The previous study had showed that changes of learning
practices take time and I therefore decided to trace changes between students that had just started the program and students that had been in the program for a longer time. By drawing on Structuration Theory the study compared novice and experienced students’ assumptions about learning. I did this by counting which support functions they most often asked for and by analyzing what that meant. I argued that support needs should change if students started adopting the e-learning view on how learning is acquired. The study started out with a literature study which generated a list of important support functions. This list was then compared to the findings in the case study.

The results of the study were:

- A list of support functions needed (as informed by the literature study).
- The finding that support needs change due to structuring processes in e-learning. The longer time a student stay in an e-learning program the more the student think and act like a constructive learner. Findings showed that students increasingly adopted the e-learning view on learning as they progressed through the program. Students increasingly took ownership of their learning and the teacher was no longer seen as the container of all knowledge. I also found that the importance of discussions also increased over time which was seen as evidence that knowledge was no longer seen as being transmitted, but rather created.
- The findings of this study furthermore suggested that special efforts to change students learning behaviour need to be introduced early in the program, already during semester one. By comparing the support function needs of novice and experienced students it was found that students when starting on semester one mainly enacted a transmission structure, whereas students from semester two and onwards started enacting a constructive e-learning structure. During the first year the students either conform to the e-learning structure or drop out.
- This study also showed the usefulness of using Structuration Theory’s modality of interpretative schemes as an analytical tool. By analyzing the students’ support needs in relation to their beliefs about learning this study identified the very structure that these students draw on in requiring a support function. Structuration Theory thus provided a tool for seeing student support needs beyond simple requests, and provided the analysis with a rich understanding of what actually happens when students start learning e-learning.
Paper VI. Learning from eLearning: Emerging Constructive Learning Practices

The sixth, and final, paper also explored if the use of technology plays a role in changed learning practices, but now with a deeper focus on what kind of learning practices that emerge. The study also differed in relation to the previous studies in that it was designed from the start with the learning structures and Structuration Theory in mind. For this study I used the Sri Lankan case and the study was qualitative and based on 23 in-depth interviews with, and observations of, students. Furthermore the connection between constructive learning practices and development was more thoroughly elaborated.

The results of the study were:

- The use of technology can contribute to a change towards more constructive learning practices. I found four constructive learning practices that emerged through technology use; individual exploring, interaction with peers, interaction with teachers, and taking responsibility of the learning. I found that increased access to information makes students more critical and that new practices of interaction make communication and negotiation of knowledge possible.
- The use of technology also supported a greater variety of different learning practices (thus allowing for more individual differences of students).
- The constructive learning practices that emerged due to the use of technology were often not enacted within the formal course and the assigned LMS. Access to technology by going to learning centres, for instance, made students search the Internet for resources and discuss with friends in the forums of their own choice.
- A confirmation of the explanatory power of Structuration Theory.

5.2 ICT’s Potential Contribution to Development

Through the results of the studies in this thesis we have seen that the use of technology has facilitated the emergence of constructive learning practices. In answering the overall research questions about whether ICT can contribute to development we need to discuss if constructive learning practices are of any good for development. I do this based on the discussions in Section 4.2.2 – “Constructivism and Development” and Section 4.1 “Theories of Development”. The view that I have taken, in relation to development, is that development is first and foremost about human development.
Human development is about having the freedom to have an influence on your own life (Sen, 1999). This is related to the constructivist notion about learning how to learn. The generic skill of learning how to learn must be of assistance in having this freedom; to be able to find information, evaluate this information and be able to apply this information to new settings is empowering for students. They say that it feels good to be in control, to explore and find other sources of information than that of the teacher.

Technology also facilitated the constructive practices of communication and collaboration, especially for those students that were geographically distant from each other. This also increased their social opportunity – which is another aspect of human development. These practices have in this way enhanced the students ”individual and collective quality of life” (Simon, 1997, p. 185).

Human development is also about humanity and equality. Collaboration practices are fundamental for students to become active and efficient members of a democratic society (Dewey, 1916). Students used to collaborating and taking opinions of others are better equipped to “function with sensitivity and alertness as citizens of the whole world” (Nussbaum, 1997, p. 8). Something which Sen (2003) would also say contributes to political security.

Finally, the students – mainly through having access to many different resources and through discussions – became more critical. Constructivist learners learn how to be critical and development is also about reflecting on our society and about changing it. This will not only make students more aware of what is happening in the society, but also in a better position to contribute to changes in that society (Freire, 1970).

In summation, constructive learning practices can be beneficial for development because:

- Development is about being in control of your life (Sen, 1999; Simon, 1997), where people can develop their full potential (UNDP, 2007).
- Development is about change. It is an ongoing process that needs continuous and collective learning and therefore learning to learn is essential (Selinger, 2009). Learning how to learn reassures people of economic and social survival (Wain, 2006).
- Development is about humanity and equality. It is about empowerment, participation and gender equality (Mchombu, 2004). These values are made possible through the awareness of cultural differences and the sharing of ideas with people from diverse backgrounds (Sen, 2003; Nussbaum, 1997).
In Figure 12 I have summarized the findings in relation to learning practices and related these to how they may have a potential to support human development. By going through all my studies (as reported in the papers underlying this thesis) I have summed up technological applications mentioned, the constructive learning practices that emerged in relation to the use of these applications, and connected these practices to the definitions of development discussed in the thesis.

Figure 12: Technology-facilitated learning practices and potential human development
A first conclusion in this thesis is that the major challenge perceived by students in my case studies was the change in learning practices that e-learning requires. I found that technologies per se did not constitute a problem for these students. The students were highly comfortable with the technologies, but knowing how to learn was the problem.

The most important conclusion in this thesis is that technology can facilitate a change towards the constructive e-learning practices advocated in the two cases. Even though e-learning was new for the students under investigation, and not very common in either of the countries, I did identify changes in students’ mind-sets that emerged through technology use. This emphasizes that technologies can be useful in distance education because they can support and facilitate the emergence of a constructive structure. In Structuration Theory terms, structures become solid if they are repetitively enacted across space and time. The constructive structure in my cases is just emerging and the practices cannot yet be said to be repeatedly acted over time. So in order to make these structures solid it thus follows that we should encourage the continuous use of technology in distance education (e.g., by improving the infrastructure or by funding students’ use of technology).

Having said this, these structures could emerge without technology. There is no strict cause-effect relation where technology is the reason why these practices emerge. Technology has however facilitated these practices, especially in regard to
distance educations, by making these practices easier. Technology made it easier for students to collaborate despite geographical distances, it was easier to explore and find alternative sources of information (by using the Internet) and it was easier for students to start communicating with the teacher (because of the more anonymous way to communicate via e-mail, SMS and discussion forums).

The constructive practices facilitated by technology use were: interaction with teachers and peers, peer collaboration, individual exploring and taking responsibility of the learning. An important conclusion in relation to these findings is that these practices do not necessarily emerge through the formal course taken or the assigned technology use. The project plans for the cases had the explicit aim to add technology in order to increase interaction, student performance and completion, but in so doing management only calculated on people using the technology as intended. In the Sri Lankan case I found that this was not always the case. The charming thing with people is that they do not always conform; they use technology in all possible sorts of (not always intended) ways or chose to not use it at all. This well illustrates Giddens’s (1984) notion of humans as knowledgeable agents – changes are brought about if needed or desired, in a reflexive monitoring, and in this case it was proven to be beneficial to use sources outside the LMS. People are simply using technology how and for what they want in line with their demands or interests.

Another conclusion of this thesis, in relation to the first study on challenges of e-learning, is that there is a need for openness in relation to the many different problems that need to be researched and focused on in practice. This thesis has shown that there is a complexity of related challenges that need to be addressed in e-learning. This is important for the reason of not by default taking progress in one field (which typically is technology when Information Systems researchers are involved). I also found a bias regarding which factors are investigated in developing countries and which are investigated in developed countries. I concluded that while all challenges found were also relevant for developing countries there is currently an emphasis on technology and contextual factors when researching e-learning in developing countries. Factors pertinent to individuals’ characteristics, much researched in developed countries, are not yet high on the agenda in research on developing countries. Since I argue that the hierarchical teaching methods in many developing countries should develop into constructivist learning practices the individual’s characteristics are highly important factors to investigate.
In summation, we must keep an open mind and always in detail consider all components of the complex system in which e-learning takes place.

A final conclusion, in relation to Giddens and Structuration Theory, is that Structuration Theory has a strong explanatory power for understanding students’ actions and mind-sets. By using Structuration Theory’s modalities as analytical tools I was able to see the relation between the facilities used and which norms and interpretative schemes that were related to this use. This provides the Information Systems field with a more nuanced and rich understanding of what structures emerge, and why, when students start using technology in their learning.

6.1 Contribution

A major contribution of this thesis has been to increase the understanding of how ICT in distance education can facilitate constructive learning practices. By arguing that constructive learning practices are conducive to societal change and development this finding also has possible implications for development. If development is seen as a process for enhancing the individual’s quality of life and possibilities of getting empowered through access to information, then some development has been accounted for in this thesis. On an individual level many of the students in my studies report of new opportunities for personal empowerment that were facilitated by the introduction of technologies in their courses.

What this thesis shows is that constructive learning practices conducive to development have emerged due to the use of ICT and that these practices are now competing with traditional learning practices that are believed to inhibit development. This thesis has shown that despite all well-known problems with infrastructure and limited use of technology, when technology is used it can support a change towards more constructive learning practices. Increased access to information makes many students more critical and new practices emerge that make communication and negotiation of knowledge possible.

This understanding is important for researchers within the field of ICT4D who are concerned about how ICT can be used to make a difference for development. Whereas it could be argued that understanding by itself does not lead to any differences or change, I would argue that we in many cases need a deeper understanding of the complex relationship between ICT and development before we intervene.

Braa and Vigden (1999) make a description of the Information Systems research framework where interpretative studies lead to understanding, and where intervention studies (typically action research) lead to change. Even though
agreeing to their discussions about the trade-offs between being an “observer who can make interpretations (understanding) and a researcher involved in creating change in practice” (Braa & Vidgen, 1999, p. 34), I find that our field occasionally does not have enough understanding so as to make well considered interventions. As long as we find ICT4D projects failing without us understanding why, or development agencies not reflecting on what kind of ICT-supported development they are promoting, I believe there is a need for more understanding preceding action. This thesis has contributed in this sense by providing a deeper understanding of what learning practices can be facilitated by ICT use in distance educations.

Another contribution of this thesis relates to the exploratory parts where I have sought to identify major challenges for e-learning in developing countries. These parts emerged through a strong problem focus where it was desired to find all problems and challenges experienced by previous research, and also by students and staff in the two case studies. The outcome from this part was an understanding of the complexity and magnitude of e-learning challenges which need to be addressed in e-learning for development. This is a contribution to practice as the framework can be used as a check-list of factors that should be addressed when designing a project. It is also a contribution to research as it can be used to guide research, both in focus and in outcomes. In focus, because the framework helps understand which factors are currently under-researched and should be given more focus. In outcomes, because outcomes of research on any factor should be related to the other factors.

A second contribution from the categorization of challenges is the realization that there is a bias regarding which factors are investigated based on the economic status of a country (i.e., culture is investigated in poorer countries and the individual is investigated in richer countries). My literature study on e-learning in developing countries showed that most research has focused on one or a few selected levels (e.g., technological issues, the cultural impact and so forth). No matter how useful this research has been for fostering thorough insights into certain aspects of e-learning, a broader view is desired. This is important because “research topics in developing countries are usually deeply intertwined with issues of power, politics, donor dependencies, institutional arrangements, and inequities of all sorts” (Walsham et al., 2007, p. 324). Based on this understanding, and trying not to enforce this bias, an open approach is therefore suggested in all empirical work. This includes not only asking questions based on an existing framework, but to also include the open, often simple questions, such as: “What is hardest for you in
studying in distance mode?” In this way we will often find new issues not always covered by our frameworks.

A further contribution has been to illustrate how different educational ideals and pedagogies are related to different notions of development. Within the research field of ICT4D there are many different views on what development is and the educational initiatives undertaken will therefore vary. This thesis has shown that the kind of education that is promoted reflects a view on what development is, which then in turn impacts on the kind of development takes place. In this way a contribution is to guide governments and development agencies to make rational and transparent choices for the reason of not believing that any education initiative by default leads to the kind of development desired.

Exchange and cross-referencing of research between the field of Information Systems field and that of Education are also rare (Gupta & Bostrom, 2009) so a contribution has also been to give new insights into this combined field.

The major theoretical contribution has been to show the explanatory power of Structuration Theory when applying it to the empirical analysis when researcher and informants are geographically and socially distant. Structuration Theory, in particular as it has been adapted by Orlikowski (2000) and Halperin and Backhouse (2007), can work as a theoretical lens in order to provide a deeper understanding of the interaction between ICT and its surrounding context – and particularly so in contexts unfamiliar to the researcher. This makes Structuration Theory especially relevant for Information Systems researchers in developing countries where technology introductions are often researched by exogenous researchers.

Structuration Theory has previously been put forward as a tool for deeper examination and understanding of socially and geographically different contexts. Walsham, in his study on ‘cross-cultural’ software production (Walsham, 2002), made a new contribution to our field in using Structuration Theory to analyze conflicts of structures when a Jamaican insurance company employs a team of Indian software developers. This study is not focused on learning, however, and Walsham’s view on technology as embodying structures differs from my use of Structuration Theory. Others, such as Rye (2009), Gynnild (2002) and Halperin (2005) have used Structuration Theory as a tool for analyzing changes in a learning environment. Gynnild’s study is concerned about change of learning behaviour based on the distinction between surface and deep approaches to learning, but there is no ICT involved. Rye makes use of Structuration Theory in a
‘cross-cultural’ setting (in regards to the researcher and informants being socially and geographically distant) when investigating the use of Internet in distance education in Indonesia. This interesting study looks into the reasons for students to use Internet in distance education, but not in relation to norms and beliefs about how one learns. Closest to my use of Structuration Theory and also to my unit of study – learning practices – is the work of Halperin and Backhouse (Halperin, 2005; Halperin & Backhouse, 2007). Whereas I have been much influenced by their extensions of Structuration Theory (and the IS-specific Practice Lens in particular) the case where it was developed and tested was much different from mine. Halperin’s case concerned the use of WebCT in an on-campus Master’s programme given one year at a university in the United Kingdom and the second year at a university in USA. The students in her study use the LMS alongside regular face-to-face instruction and there is no real distance use of the system (except for a goal to encourage communication between students at the two universities). The lacking distance component in her study, indicating a lower need of the system, is probably the reason why Halperin’s analysis did not show any real transformation of pre-existing practices whereas my analysis did.

In this thesis the choice to explore students’ actions and their motives by using a structural lens made a description possible where the challenges in introducing e-learning in developing regions are due to competing, or even conflicting, pedagogical structures. In tracking structuration processes over time I was able to identify small changes to the students’ mindsets and by analyzing the students’ actions in relation to their beliefs about learning, the very structure that these students draw on could be identified. By using Structuration Theory’s modalities as analytical tools I was also able to identify many conflicting norms and interpretative schemes that could otherwise have been easily misunderstood. All this in turn provides the Information Systems field with a more nuanced and rich understanding of how and why some practices emerge when students start using technology in their learning.

In a way Structuration Theory can also be seen as a tool to ‘cultivate our humanity’ (to paraphrase Nussbaum). By making efforts to understand other people’s actions based on their norms, beliefs and available facilities we need not be judgemental about students simply recapitulating the teacher’s words without reflection or even cheating. We may not like these actions, but by knowing where these actions stem from, and by understanding the very structures that these people draw on, we can act from that understanding and start dialoguing from an understanding. Problems in recognizing each other as fellow human beings is often due to the fact that “actions and motives require, and do not always receive, a
patient effort of interpretation” (Nussbaum, 1997, p. 63). I believe that Structuration Theory can assist us in making this patient effort of interpretation.

A contribution in relation to the use of Halperin and Backhouse’s extended version of the Practice Lens has also been to test its applicability and usefulness in a new context. Not only a new geographical and social context but also to distance educations. In doing so I have affirmed how useful Halperin and Backhouse’s proposed elaborations of Structuration Theory are.

A final, and possibly new, contribution of my Structuration Theory analyses is that they revealed not only conflicts of structures between people (such as Walsham’s account of “structural contradictions” between Jamaicans and Indians, or my accounts of different learning structures at different learning centres) but also the ability of an individual to enact different structures. Several students in my studies claimed, and were also observed, to enact both the transmission structure and the constructive structure interchangeably. When in a classroom some students believed that the teacher could and should put fixed knowledge into them and that their peers could not contribute in this, whereas when in on-line discussion they valued their peers’ suggestions and created and re-shaped knowledge based on the belief that this is the way knowledge is created. This is a contradiction, or a blur, within the very minds of the students that they seem to handle quite well. This shows that opposing structures do not always clash, and it also shows how people cope, when some structures are emerging and others are being contested. For future Structuration Theory analyses the very idea of conflicting structures being drawn upon in parallel could be an interesting pursuit.

I will end this discussion by summarizing the contributions and their potential uses in Table 7 (next page).
<table>
<thead>
<tr>
<th>Contribution</th>
<th>Potential use</th>
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<tr>
<td>To increase the understanding of how ICT in distance education can facilitate constructive learning practices and the development potential these practices have.</td>
<td>The link between technology use, emerged constructive learning practices and development informs not only governments and donor agencies about the possible roles that ICT can play for development, but also educators about the pedagogical opportunities that the use of ICT can create. This understanding is of importance for practitioners and teachers when designing an e-learning system and also for researchers who want to continue exploring this area or intervene in educational projects.</td>
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<tr>
<td>To provide an understanding of the complexity and magnitude of e-learning challenges which need to be addressed in e-learning for development.</td>
<td>This is a contribution to practice as the framework can be used as a check-list of factors that should be addressed when designing a project. It is also a contribution to research as it can be used to guide research on which factors to investigate.</td>
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<tr>
<td>Showing that there is a bias regarding which factors are researched based on the economic status of a country (i.e., culture is investigated in poorer countries and the individual is investigated in richer countries).</td>
<td>This is a contribution mainly to research – both in relation to focus and in outcomes. In focus, because the framework helps understand which factors are currently under-researched and should be given more focus. In outcomes, because outcomes of research on any factor should be related to the other factors.</td>
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<tr>
<td>The illustration of how different educational ideals and pedagogies are related to different notions of development.</td>
<td>This part could serve as a guide for governments, educational institutions and development agencies in order for them to make informed choices on which educational efforts lead to which kind of development.</td>
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<td>Demonstrating the usefulness of using Structuration Theory in an unfamiliar context – the way to apply Structuration Theory when being socially and geographically distant from the case.</td>
<td>This contribution should be relevant for any exogenous researcher that wants to get a deeper understanding of an unfamiliar context. The way I have used Structuration Theory provides the researcher with more sensitivity and deeper understanding of why people do what they do. In a larger sense this understanding can also make us having more empathy as human beings.</td>
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Showing that new extensions of Structuration Theory provided this research with new insights.

This contribution is of relevance for anyone interested in using Structuration Theory. There are already many IS-adapted versions of Structuration Theory in use, but even one of the most recent extensions proved to give new insights. This implies that more elaborations are needed and welcomed.

Analysis showing that students have the ability to concurrently enact contradictory structures.

Researchers interested in taking Structuration Theory further could well benefit from elaborating the notion of multiple – often contradictory – structures that I have found in some of my studies.

6.2 Credibility Concerns Related to Case Study Research

Case studies in general and interpretative studies in particular are often on trial based on concerns about their credibility. I will therefore address the methodological problems related to case study research and interpretative studies by using criteria suggested by Lee (1989) and Klein and Myers (1999). Lee (1989) addresses several problems with the case study research: no controlled observations, non-replicability and non-generalizability. Whereas we who today belong to the Information Systems field rarely need to convince positivists of the strengths of qualitative research, or how we can “be in step with the natural science model” (Lee, 1989, p. 41), I will still include Lee’s concerns in order to connect to a wider audience.

The lack of controlled observations (i.e., no laboratory setting) in my studies is countered by the use of many different data sources – i.e., triangulation. For students’ interactions with the systems I have not only referred to what I have seen them do, but also included their self-reported uses (through questionnaires and interviews), other informants’ descriptions of their uses (peers, teachers and administrators all have their observations of the students use), and in some cases even system loggings (technically recorded uses) have been used.

‘Non-replicability’ could be a problem if we mean that an independent evaluator should be able to replicate my procedure, because it is highly unlikely that s/he would get hold of the same students. And even if so, the students would probably have changed their minds about things and do things differently etc.
What I have tried to be, however, is as transparent as possible in what I have done. All recordings and all material is also available for someone to use. Another, more interesting, way to replicate my findings would be to do a similar study in a similar setting. If, as I claim, new learning practices emerge through (not too restricted) technology use in distance educations then this finding should be found in cases similar to mine.

The problem with ‘non-generalizability’ is not really a problem. No theories generated through qualitative research are immediately generalizable in the sense of being ‘universal laws’. What they do, however, is to show a picture (even if ever so subjective) of what happened at some place with some people. The propositions or theories that these interpretations yield are still testable against similar empirical circumstances and can be confirmed by other case studies. The findings of case studies should be regarded as proposed theories which are “generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent ‘a sample’ and the investigator’s goal is to expand and generalize theories (analytical generalizations) and not to enumerate frequencies (statistical generalization)” (Yin, 1994, p. 10). When doing interpretative research we are a bit ahead of generalizability – we are providing the world with ideas and propositions that could be tested and possibly generalized (if we think that is possible or even interesting).

Framing my research within Klein and Myers (1999, p. 72) set of principles for evaluating interpretive field research we find the following (Table 8):

<table>
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<tr>
<th>Principle</th>
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<td>The first principle of the ‘Hermeneutic Circle’ refers to the notion that “all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form”.</td>
<td>Even though I have not made this explicit by using the concept of ‘hermenutic circles’, I have, in my descriptions of my coding, explained the iterations from parts to the whole. In some ways the papers themselves can be seen as separate studies that lead to a picture as a whole – which is this thesis.</td>
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<td>The second principle on ‘Contextualization’ is about how the social and historical background of a research setting needs to be explained in order to understand the present.</td>
<td>I have described the projects’ backgrounds (including the educational institutions and contexts where they take place) as well as the historical learning practices of the students.</td>
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<tr>
<td>Principle</td>
<td>Description</td>
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<td><strong>Interaction Between the Researchers and the Subjects</strong></td>
<td>The third principle of 'Interaction Between the Researchers and the Subjects' means that I should critically reflect on how my data, or findings, was socially constructed through the interaction between the researchers and participants. I have described how the interviews were open-minded enough to allow for a shared informing of each other (Section 2.7 Limitations). Furthermore, I have reflected in this thesis about my improved understanding of developing countries and how I have had opportunity to question my own assumptions.</td>
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<tr>
<td><strong>Abstraction and Generalization</strong></td>
<td>The fourth principle of 'Abstraction and Generalization' is about relating the findings of my interpretations “to theoretical, general concepts that describe the nature of human understanding and social action.” I believe this is evident through my use of Giddens’s Structuration Theory to understand and explain different learning practices.</td>
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<td><strong>Dialogical Reasoning</strong></td>
<td>The fifth principle of ‘Dialogical Reasoning’ is about being open to contradictions between the “theoretical preconceptions guiding the research design” and actual findings. This is typically done through many revisions, but since I initially did not have many theoretical preconceptions this has not been done. The use of Structuration Theory emerged as a result of the findings. However, by being transparent with my own ‘theoretical preconceptions’ – my pre-assumptions and underlying perspective (e.g., 2.5.1 Personal motivation) – readers can judge the rationality and fairness of my analysis by themselves.</td>
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<tr>
<td><strong>Multiple Interpretations</strong></td>
<td>The sixth principle of ‘Multiple Interpretations’ is about being sensitive to possible differences in interpretations among the participants. In most cases I have used multiple witnesses of events (e.g., comparing perceptions and opinions of students with that of the teachers and staff) as well as a broad repertoire of data collection sources. This is elaborated in Section 2.5.3 and 2.7.</td>
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<tr>
<td><strong>Suspicion</strong></td>
<td>The seventh, and last, principle of ‘Suspicion’ requires sensitivity to possible “biases” and systematic “distortions” in the narratives collected from the participants. My two cases are partially financed by Swedish donors, and since I have occasionally had the role as an evaluator, suspicion has often been my guiding star. As I describe in some of the papers and in Section 2.7 and 2.5.3, careful steps had to be taken to find out what the informants really meant (e.g., by using multiple data-sources, by being a pushy interviewer, by assuring people their total anonymity).</td>
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</table>
6.3 Limitations and Future Research

A possible limitation to this research is how many complex issues may seem to have been simplified because of my use of dichotomizations. Many of my discussions are built around dichotomizations of different phenomena. Developed countries are contrasted with developing countries, traditional development theories with alternative development theories and traditional education with e-learning.

Even though I am aware that boundaries are much more blurry than that and that "when it comes to practical matters circumstances compel us to compromise" (Dewey, 1938, p. 1), there are several reasons for using these binary descriptions. One reason is the illustrative power it gives to the readers. Another is that it works as an analytical tool for me as a writer. A final, and most important, reason is that dichotomizations of these kinds make explicit that there are always alternatives. In our world of strong discourses (whether the discourse is development or education) people tend to talk resolutely about the one solution they abide to, whereas the use of dichotomizations shows that there are always other ways of doing, or thinking about, things.

Other limitations of this research are related to possible opportunities for a broadened scope (i.e., future research). In exploring the potentials of technology for development I have mainly focused on the instances where constructive learning practices emerged. A nagging feeling during this exploration has been that it would be equally important to investigate the instances where these practices do not emerge. Since it has been documented in many studies that technologies can also cement existing practices (e.g., Garrison & Anderson, 2003; Laurillard, 2008; Ramsden, 2003) it would be interesting to compare studies with different outcomes, or different outcomes within the same study (since not all students changed their learning practices in my case studies either).

In order to guide practice a comparative study with cases where technology enforces a transmission structure would be useful because then we could see what was different in the design of the projects – was it a managerial aspect that made the difference? Was it, as has been suggested in the last paper, due to lack of restrictions in technology uses? Was it due to flexible and open students brought up in a way where changes are not seen as threatening? Or was it something else? If researching differences within a study it would be fruitful to do a thorough Structuration Theory analysis of the instances where students did not conform to the e-learning practice. In the eBIT case it would be interesting to extend the research to include the first semester drop-outs and trace which norms, beliefs and
assumptions they draw on in not using the technology or when simply dropping out. An analysis of the lack of emerged constructive learning practices has thus yet to be conducted.

A continuation of this research would also benefit from more clearly separating the different levels of education when discussing changes in learning practices. Most of the students that I have talked to described their previous learning experiences based on pre-university studies. It could well be that some of the challenges experienced could be due to students moving to a higher level of education – not only that they are studying in distance mode. Having said this, some of my informants, which had studied at university before, said that campus-based university studies were just the same as when they studied at lower levels. Still, a more detailed charting of what levels of education the students refer to in their descriptions could have been conducted. A continuation could also be to compare the experiences of students that move to a higher level of education in campus mode and those who move to a higher level in distance mode.

Another continuation of this thesis would be to go back to the framework of emerging issues for e-learning that initiated this research and focus on any of the other challenges that emerged. Even if the pedagogical change was identified as very urgent in my studies, there is a need to investigate factors such as costs, gender differences or the regulatory setting. Additionally, and possibly even more important, would be to research inhibitors to e-learning outside my framework of challenges for e-learning. Considering the digital divide issue addressed in section 1.2, we need to find out what the field of ICT4D can do for those who drop out, or never even apply for education, due to lack of access. In a large survey on distance education in south Asia it was found that the distance education in the poorer parts of Asia basically only reaches urban, middle-class men:

“Students are mostly urban, male, middle class, have substantial prior learning, and are white collar workers. Provisions for and ease of access to those who do not fall within this newly privileged group are minimal, and where they exist, support for learning to them is almost none” (Dhanarajan, 2001, p. 63).

Even though I do not have any data of my informants’ economic status, based on their appearances a qualified guess is that they do not represent the poorest of the poor.
This thesis has in several ways been a journey. Physical journeys to Bangladesh and Sri Lanka for data collection; to Ethiopia, Kenya, Senegal, England, Finland, Cyprus and USA for presentations and discussions about the findings. These travels have opened up my eyes for all differences and colours in the world, but mainly to similarities between the people of our world. I have, without exceptions, at all places had good encounters with students, women and men, with whom I have shared many similar problems, joys and jokes.

Other journeys have been mental and related to being an insecure PhD-student terrified of the word “theory” to daring to have opinions about one of the biggest ones.

If defining learning in the constructivist sense as “a qualitative change in a person’s view of reality” (Ramsden, 2003, p. 7), then the biggest learning for me, and also the most important journey, has been on an emotional level and it is about hope. Before I started my travels the only knowledge I had about developing countries was what I saw on TV and read in papers. Media seems insistent in only showing famines, dictatorships, diseases and violence. This was how I perceived the so called third world – as a place full of horror and despair. But during my travels I met so many happy, hard-working people everywhere, with brilliant ideas and with strong wills to improve their living conditions. Since I am dealing with students I have mainly talked to younger generations of these countries – and they are very open-minded, clever and competent. Before my first journey to Bangladesh I did not have much hope for the world, but now I have. I honestly believe that there is good hope for developing countries.
To conclude I will borrow the words of Freire, who believed that education could make this world a more just and friendly place (Freire, 1970, p. 40):

“From these pages I hope at least the following will endure: my trust in the people, and my faith in men and women and in the creation of a world in which it will be easier to love.”
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