EXPLORING THE DIFFUSION OF E-LEARNING:
GENERAL AND ENABLING GUIDELINES FOR IMPLEMENTATION OF COMPUTER-AIDED TEACHING IN DEVELOPING COUNTRIES

Bachelor's thesis in Informatics
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VT 2012:KANI13
Title: Exploring the diffusion of e-learning: general and enabling guidelines for implementation of computer-aided teaching in developing countries.

Year: 2012

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Abstract

The purpose of the study was to create guidelines regarding effective diffusion of e-learning to and within developing countries. Another aim of the study was to identify challenges and problems related to the diffusion of e-learning, as well as identifying what characterizes a successful ICT diffusion project. To achieve the purpose of the study a case study was performed in Thailand, where two different schools, i.e. two cases that had been targeted by ICT diffusion projects were studied. In combination to studying the schools, the donor side of the project were also included in the study. The study was conducted with a qualitative research approach, and was divided into one inductive and exploratory phase, which generated a theory, and one deductive phase where the theory was both theoretically and empirically validated. To gather the empirical material, eight semi-structured interviews were conducted of which six included staffs from the two schools, and two included donors that were involved in one of the studied ICT diffusion projects. Yet another semi-structured interview was performed with a person involved in an ICT diffusion project, which helped to perform the empirical validation of the generated theory. With the help of the collected empirical material as well as through existing theories it was possible to identify numerous of challenges regarding diffusion of e-learning to and within developing countries. The challenges were primarily connected to language, culture, governmental, lack of computer knowledge and infrastructural. To tackle the challenges a number of characteristics regarding effective ICT diffusion projects in developing countries were identified. These characteristics included the importance of doing a proper investigation about the recipients, follow ups, provided right amount of computers, provided software that had been adapted and provided education about how computers should be used. Based on the challenges and characteristics guidelines for effective diffusion of e-learning to and within developing countries were designed. The knowledge about challenges and characteristics led to the identification of two important findings. The first was that the diffusion of e-learning to developing countries is highly dependant on the diffusion of ICT to the schools, as an evident problem that existed was that the schools lacked the proper technical infrastructure to be able to support computer-aided teaching. The other finding was that in order for the diffusion process to be effective, it is vital to provide information and education about the technology in advance of the implementation. These two findings lead to that the 19 created guidelines were divided into two categories; basic guidelines for diffusion of ICT and enabling guidelines for diffusion of e-learning.

Keywords: e-learning, computer-aided teaching, diffusion, guidelines, ICT, developing countries, rural areas
**Acknowledgements**

First of all we would like to thank the Swedish International Development Agency (Sida) for providing us with scholarships and thereby giving us the opportunity to conduct this study in Thailand. We would also like to thank our contact person in Thailand, Mr. Jerker Helander for arranging with contacts and accommodation.

Secondly we would like to thank our supervisor Dr. Anders Hjalmarsson. Without your help and encouraging words throughout the entire research process this thesis would not have been what it is today.

We would also like to express our gratitude towards all respondents and informants that participated in the empirical data collection of this study. Without you it would not have been possible to conduct this study.

Last but not least we would like to send a special thanks to Mr. Håkan Alm and our interpreter Ms. Opel, who also became a dear friend, for providing us with help and support throughout the entire research process. Without you two it would have been impossible to conduct this study.

Borås 2012-05-30

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1 Introduction

1.1 Introduction to the area

The rapid development in information and communication technologies (ICTs) has led to a technical disparity (Fong, 2009). This technical disparity, that can occur both within a single country as well as between developed and developing countries, is often referred to as the *digital divide*. Fong (2009) argues that the digital divides that exists today cannot only be confined to computer or Internet use; but that it also refers to infrastructural problems, like the accessibility to fixed phone lines and mobile phones. This is worrying as some of the most common reasons to the generally low educational level in developing countries are infrastructural problems combined with a shortage of teachers (Andersson & Grönlund, 2009; Simba, 2010).

So how should these infrastructural and teacher related problems be solved? Can *e-learning*, in this study defined, in accordance with Lujara (2006), as an alternative way of teaching and learning which includes delivered instructions via e.g. Internet, interactive TV or CD-ROM, be the answer? Maybe it can. At least Andersson and Grönlund (2009) claim that e-learning has the potential to solve a lot of the existing problems in developing countries, not least the shortage of teachers. Simba (2010) also sees great potential in e-learning and mentions that one advantage with e-learning is that the education can take place independent of time and place which can help to overcome some of the existing infrastructural problems.

Lately e-learning has begun to spread to developing countries in an increasing pace. Today there are many ongoing projects aimed at increasing the general educational level in developing countries. One of these project is ‘one tablet per child’, an educational policy project in Thailand that aims to provide all first year students the same opportunity to keep up with technological development (Willson, 2012). The fact that a journal called ‘Electronic Journal of Information Systems in Developing Countries’ exists and that there are an annual conference called ‘eLearning Africa’¹, that focuses on enabling development of e-learning in Africa, are two indicators that there is a genuine interest for e-learning in developing countries. Any attempts to bridge the digital divide and make the diffusion of e-learning more efficient are therefore most likely to be received with open hands by the population.

1.2 Research overview

Even though e-learning has the potential to raise the average educational level in developing countries, there are challenges that can hinder the diffusion of e-learning in developing countries. Andersson and Grönlund (2009) describe that the concept of e-learning has begun to spread to developing countries and that it is believed to have the potential to overcome some of the main educational problems in those countries. This statement is supported by Omidinia, Masrom and Selamat (2011) and they agree that e-learning have the potential to solve a lot of the existing educational problems. Bhuasiri,

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¹ [http://www.elearning-africa.com](http://www.elearning-africa.com) [2012-05-28]
Xaymoungkhoun, Rho and Ciganek (2011) describe that both external sources, e.g. social and environment, and internal sources, e.g. individual characteristics, are crucial when implementing e-learning systems.

One main issue that Omidinia, Masrom and Selamat (2011) bring up is the shortage of teachers in developing countries. Even so, Andersson and Grönlund (2009) describe that other challenges also exists that can hinder the implementation of e-learning projects. There are also many developing countries that lack vital e-learning components such as computers, electricity and the appropriate skill set (Omidinia, Masrom & Selamat, 2011). The availability of hardware and Internet connections are also mentioned as important factors when implementing e-learning in developing countries (Williams & Eyo, 2011). In contradiction to Williams and Eyo (2011), Lating (2009) describes that an Internet connection is not as vital and instead proposes the use of CD-ROM based courses to help overcome the existing infrastructural problems. However Pade-khene and Sewry mentions that large amounts of ICT-project in developing countries are linked to failure and wastage of resources. Based on the above mentioned, Williams and Eyo (2011) emphasizes the importance of an existing IT-infrastructure. Omidinia, Masrom and Selamat (2011) also describe that students’ attitudes towards e-learning can be an issue, as the tradition in developing countries is to teach in a more traditional way. It is vital for those concerned with the implementation of e-learning in developing countries to understand all existing challenges.

Andersson and Grönlund (2009) have created a conceptual framework for e-learning challenges in which they have listed 30 challenges divided into four main categories: Course challenges, challenges related to the characteristics of the individual, technological challenges and contextual challenges. The researchers emphasize that there are some main challenges related to courses; the curriculum needs to be specifically designed with e-learning in mind, as there are differences between traditional learning and e-learning. Other challenges mentioned are that participating students misses social engagement and a feeling of not being involved, which leads to a higher rate of dropouts.

The researchers describe that a large challenge in developing countries is that both teachers and students lack the appropriate computer and technological skills, which leads to a low technological confidence. This statement is supported by Williams and Eyo (2011) when they describe the lacklustre technological knowledge of the teachers in developing countries. Lee, Lee and Yoon (2009) also describe that it is vital to educate teachers if the outcome of e-learning projects should be a success. There are also a number of technological issues, which is something that Omidinia, Masrom and Selamat (2011) also agrees with. The fact that it is vital to educate teachers is an issue as Andersson and Grönlund (2009) mention that the required training of teachers and staffs is often overlooked in developing countries.

Another factor that has to be taken into consideration when working with e-learning is the cultural differences between countries. This becomes evident as Pagram and Pagram (2006) argue that education is a process of cultural indoctrination and that culture therefore must be seen as a part of education. Based on this the researchers describe that children from different countries attitudes and behaviour differs from one and other but that motivation and beliefs always plays an important role in learning.
There have been numerous attempts to create guidelines for how to make e-learning efficient and useful as an educational instrument. Khan, Rahman and Ahmed (2011) for example introduces a framework for adopting quality e-learning systems in primary educational institutes. The aim with this framework is to enable the development of primary level education systems through the advantages of e-learning systems. Holsapple and Lee-Post (2006) also tries to clarify the success of e-learning in their study. In the study Holsapple and Lee-Post introduces an e-learning success model which point out that when the success of e-learning is to be measured, the six dimensions system quality, information quality, service quality, use, user satisfaction and net benefits have to be taken into consideration. The authors also argue that students online readiness, which is measured to the degree of academic preparedness, technical competence, lifestyle aptitude, and learning preference toward e-learning, is another critical factor that affect the e-learning success.

Omidinia, Masrom and Selamat (2011) describe that government institutions in developing countries often lack qualified personnel, financial support, lack of planning and justification to mention a few, which often leads to project failures. Another challenge mentioned is that most of the technologies and designs used in developing countries are developed and deployed in a developed country context which leads to limitations when used in developing countries. Masoumi (2010) describes that a lot of the institutions in developing countries lack a strategic or technological plan, which makes the system/organization rely on a specific person instead of a plan. This leads to decisions made by that person to sometimes be biased and based on the basis of that person’s likes and dislikes.

Lating (2009) describes two alternative approaches to e-learning, one being blended, and the other being hybrid. The main idea of blended e-learning is that there should be a balance between classroom learning and online learning. The researcher describes that an approach like this allows for a more smooth transition from the more traditional education, commonly used in developing countries. Hybrid e-learning according to the researcher means that the main e-learning courses should be delivered by CD-ROM instead of online. Hybrid e-learning is aimed at students with no access to computers at home or nearby, but instead rely on the availability of computers at their schools. Hybrid e-learning is specifically designed for use by rural, disadvantaged students in Uganda.

Lating (2009) describes that by using CD-ROMs as the main platform for delivering e-learning courses to students, an increase in the amount of students that passes their exams was noticed. The researcher suggests that poor secondary schools in rural areas, by embracing the concept of hybrid e-learning, can save resources connected to construction and maintenance of Internet connectivity and Local Area Networks (LANs). As such, in contradiction to Lee, Lee and Yoon (2009) statement about a generally high initial cost when implementing e-learning, schools in the rural areas can save money by introducing the concept of hybrid e-learning and therefore get a lower initial cost. Roffe (2002) describes that the implementation of e-learning programs are associated with a high initial cost, and that a great interest for studies that evaluate whether different e-learning solutions are effective exists.
Most of the studies made within the area use a mixed-research approach, i.e. a combination of both quantitative and qualitative approaches (e.g. Bhuasiri et. al., 2009; Sun, Tsai, Finger & Chen, 2008). Theories mentioned in previous studies within the area are for example the situated learning theory and the participatory rural appraisal theory (Lating, 2009). Many researchers have also used the technology acceptance model (TAM) when studying the effects on individuals’ behavioural intention to use e-learning systems (e.g. Liu, Liao & Pratt, 2009; Sheng, Jue & Weiwei, 2008).

1.3 Problem discussion

As Fong (2009) describes, the rapid development in ICT has led to a digital divide between and within countries. If nothing is done, there is a chance that this gap will continue to increase and that developing countries will fall even further behind.

As mentioned in section 1.1, the educational levels in developing countries are generally low. One reason for this is that traditional education, which is bound to time and place, is an ineffective way to conduct education in these countries. As Omidinia, Masrom and Selamat (2011) mentions there is a lack of teachers in most developing countries. The poor economy of developing countries makes it impossible to employ the amount of teachers needed to fulfil the needs of every student. As such an alternative to the traditional education is needed.

One possible solution to this problem is to use e-learning as an educational form as it adds a more flexible way of teaching. With e-learning courses and lectures are not bound to a specific time and place, which can be seen as a solution to the existing infrastructural problems in developing countries (Andersson & Grönlund, 2009; Simba, 2010). Another dimension to e-learning is that fewer teachers are needed, and as such more students could get a proper education, which in turn can result in a higher educational level.

As Andersson and Grönlund (2009) mentions there are a lot of challenges connected to the implementation of e-learning in developing countries. A great problem when implementing e-learning in developing countries is that they generally have a poor infrastructure, as well as low access to the needed technology for e-learning (Omidinia, Masrom & Selamat, 2011). The focus on the challenges a developed country faces differs from the challenges a developed country are faced with when implementing e-learning projects. The solutions and project techniques developed in developed countries are as such lacklustre when used in a developing country context. Omidinia, Masrom and Selamat (2011) describe that the fail rate in many developing countries regarding e-learning projects is high due to this particular reason.

Pagram and Pagram (2006) describe that cultural differences between countries plays a part in the educational process. As such this has to be taken into consideration when implementing an e-learning project. But how does this affect the introduction of e-learning projects in developing countries? Pagram and Pagram argue that children from different countries attitudes and behaviour differs from one and other, but that motivation and beliefs always plays an important role in learning.

When studying previously conducted research within the area of e-learning and developing countries, it becomes evident that the results from a large part of the studies
only are representative for some specific countries. With this in mind one could wonder why only research regarding specific countries has been performed and only little research have been conducted with a more general approach in mind.

It becomes evident that many problems exist in developing countries that could have a negative impact on the diffusion of e-learning to and within developing countries. It therefore becomes interesting to further investigate the challenges and problems related to diffusion projects in developing countries as these challenges and problems can hinder the diffusion of e-learning to these parts of the world. Many problems have been identified in previously performed research, however little research exist that point towards characteristics regarding effective diffusion of e-learning and how diffusion projects should be designed to make the diffusion process as effective as possible. As these problems can be a great hindrance regarding the diffusion of e-learning to and within developing countries, one could argue that it of interest to investigate what characterizes successful diffusion projects in developing countries.

As mentioned earlier by Omidinia, Masrom and Selamat (2011) developing countries often have low access to the required technology that is needed to support e-learning. With this in mind it becomes evident that the existence of a working technical infrastructure is required if the diffusion of e-learning should be successful in developing countries. It therefore becomes important to investigate difficulties, problems and success factors for effective diffusion of ICT to and within developing countries as the diffusion of ICT can be seen as required if the technical infrastructure is to be improved.

As a lot of the research within the area of e-learning has focused on indentifying difficulties and challenges, as well as being connected to a specific country, one could wonder how these difficulties and challenges can be overcome, not only in specific countries but instead on a more general level that can be applied to more than one developing country.

1.4 Purpose

The purpose of the study is to create an understanding regarding challenges and problems related to the diffusion of e-learning in developing countries. Based on this understanding, guidelines for effective diffusion of e-learning to and within developing countries will be designed. The aim with these guidelines is to improve the developing countries’ chances to catch up with more developed countries. To design guidelines for effective diffusion of e-learning to and within developing countries are important as their current educational system is far behind those in developed countries, and as such it is an important aspect to try to develop the educational systems in developing countries.

Even if the aim of the study is to create general guidelines that can be applicable in ‘all’ developing countries, the study will be conducted, and therefore also limited to, one country – Thailand. This makes the study limited to knowledge and understanding about the situation in the rural areas of Thailand. The study is as such limited to identifying difficulties and challenges connected to diffusion projects, characteristics regarding effective diffusion and to create an understanding regarding the situations at two different schools in the rural areas of Thailand.
1.5 Research questions
Based on the problem discussion the following research questions have been created. Of the research questions, the first one is the main research question, and the following two are sub questions with the aim of helping to answer the main question.

- **RQ 1:** How should e-learning projects be designed when implemented in developing countries?
  - **RQ 1.1:** What challenges and problems related to the diffusion of e-learning exists in developing countries?
  - **RQ 1.2:** What are the characteristics regarding effective diffusion of ICT to schools in developing countries?

1.6 Target audience
The result of this study is of interest to both practitioners and the academic world. The main target audience for the thesis is people working with diffusion projects in developing countries as well as governments in these countries. This as the aim of the study is to create general guidelines that are useable in all developing countries, especially since there are many challenges and difficulties associated with diffusion projects in developing countries.

The result can also be of interest to the academic world, i.e. researchers, as the topic of e-learning is an area of interest to many researchers. However within the research field of e-learning little research has been done focusing on the same aspects as this study, i.e. effective diffusion of e-learning to and within developing countries. This fact indicates that the result of our study can be of interest for researchers within the field of e-learning, as it hopefully can help to contribute to and complement the existing research.

1.7 Outline
**Chapter 1 – Introduction**
This chapter begins by introducing the reader to the background of the selected research area. This is followed by a research overview, which aims to present previously performed research to the reader, and to motivate the relevance of the selected research area. The research area is then discussed, and based on that the purpose and research questions are presented. The target audience is also presented in this chapter.

The main purpose of the chapter is to introduce the reader to the selected research area as well as motivating why the study is important to conduct.

**Chapter 2 – Research design**
In this chapter the study’s research design is presented. The chapter begins by specifying the research perspective of the study, followed by a description over the chosen research strategy. The used data collection methods and sampling methods are presented as well as the analysis method of the study. The chapter ends with a presentation over the chosen evaluation criteria, used to secure the quality of the study.

The main purpose with this chapter is to present how the study has been conducted.
Chapter 3 – Theoretical framework
This chapter presents the reader to the chosen theories of the study. The theories address different areas e.g. general theories about ICT and developing countries, technology diffusion theories as well as theories specific to rural areas in developing countries.

The aim of this chapter is to create an overview of the research area, and to present the reader to the theories used to validate the findings of the study.

Chapter 4 – Empirical study
In this chapter a summary of the collected empirical material is presented. Information about the specific recipients will also be presented in conjunction with the presented empirical material. The most relevant topics identified during the data collection process are presented to the reader.

The aim of the chapter is to present the reader to the empirical findings of the study.

Chapter 5 – Summary of case results
In this chapter the result from a comparative analysis per case with each respondent is summarized, analyzed and presented. The summary of the results are presented for each case as well as for the two interviewed donors.

The purpose of the chapter is to present the reader with a summarized version of the empirical results, which enables a smoother transition to the comparative analysis between all cases.

Chapter 6 – Analysis
In this chapter a comparative analysis between the two cases are presented, followed by a presentation of a set of preliminary guidelines. The next part of the chapter addresses the validation processes of the study; a theoretical and an empirical validation of the preliminary guidelines.

The aim of the chapter is to analyze the collected material to find patterns between the cases, and based on that, combined with the validations, come up with a set of guidelines.

Chapter 7 – Discussion
This chapter focuses on discussing the contribution of the findings and result of the study in relation to existing theories, i.e. to clarify the knowledge contribution of the study. In addition to discussing the knowledge contribution to existing theories the value for practitioners within the chosen research area is discussed.

The purpose of this chapter is to place our finding in a larger context; the knowledge contribution to the target audience.

Chapter 8 – Conclusions, evaluation and further research
The aim of this chapter is to present the findings and result of the study; the answer to our research questions. How the chosen evaluation criteria of the study have been used to ensure the quality of the study will also be presented, as well as presenting limitations of the study in relation to the chosen criteria. A short discussion about how the chosen research method has been used in the study is also presented. The chapter ends with suggestions for further research, which are based on the identified limitations of the study.
2 Research design

In this chapter the study’s research design, which is based on the purpose with the study and the research question defined in the last chapter, is presented. The chapter begins with a specification of our research perspective followed by a description over the chosen research strategy. The research process, data collection methods, sampling methods as well as the analysis method of the study are then presented to provide the reader with a better understanding of how the study was conducted. The chapter ends with a presentation over the chosen evaluation criteria, used to secure the quality of the study.

2.1 Research perspective

The two main ontological research perspectives are **objectivism** and **constructionism** (Bryman & Bell, 2011). Bryman and Bell (2011) describe that constructionism, as opposed to objectivism, sees phenomenon such as organization and culture as something that is created and can be influenced by its actors; it is the social actors that create the social phenomenon.

We as researchers believe that social phenomenon can have an external reality, but that the individuals that inhabit it can, and does influence it. To achieve the purpose of the study we were interested in creating an understanding of the perception and acceptance of a project, seen through the eyes of the targeted individuals. As such one could say that we have been primarily constructivistic in our way of thinking. Our view on the collected data is that it represents a description of what a specific individual has said, and as such we understand that the collected data cannot be objective.

The two main epistemological research perspectives are **positivism** and **interpretivism** (Bryman & Bell, 2011). Bryman and Bell (2011) describe that researchers with an interpretivist approach aim to gain access to people's 'common-sense thinking' and hence to interpret their actions and social world from their point of view; to get a subjective meaning of social actions. Interpretative studies try to identify, explore and explain how factors in a particular social setting are related and interdependent to each other, and look at how people perceive their world and understand the meaning of it from their point of view (Oates, 2006). Another perspective described by Bryman and Bell (2011) is **hermeneutic**, which is commonly used within interpretivism. Hermeneutic is concerned with the interpretation of human action through the perspective of the social actor.

We were interested in getting knowledge about how individuals have perceived the usefulness of a project and accepted it, and we believed that the individuals could have different perceptions regarding the project. With that in mind we did not believe that everyone had the same thoughts about the project. As much of the data we collected was descriptions of experiences, it was important for us to be able to interpret and understand the data from the respondents’ point of view. This enabled us to transform the stories to useful data for our research. With this in mind, one can say that we were both interpretivistic and hermeneutic in our research perspective.
As the research perspective of the study had a hermeneutic and interpretivistic focus, i.e. we were interested in creating an understanding based on different persons’ point of views, a qualitative research approach was best suited, and therefore used. This as a qualitative research approach could provide us with rich and detailed data, in the form of stories from persons’ point of views, with depth rather than breadth. The use of a qualitative research approach was further strengthened by the fact that Oates (2006) and Yin (2003) describe that this is a typical approach for case studies. Bryman and Bell (2011) also argue that our research perspectives often are used by qualitative researchers, something that made it natural for us to take on a qualitative research approach.

2.2 Research strategy
As described in section 2.1 we used a qualitative research approach. To get the data we were interested in we conducted a case study where we used two different cases as the source of information for our study. The reason to why we chose to use multiple cases within our study was to get even richer and more detailed data, in addition to that it also made it possible for us to do a comparison between the two cases and get more accurate data (Oates, 2006). The fact that we chose two cases also helped us to alleviate the problem of generalization that is connected to case studies in some way; albeit smaller, the problem about generalization still existed (Oates, 2006; Yin, 2003).

As little had been written about our specific area of research, we decided to divide our study into two phases. The first phase of the study was exploratory, and the aim with that phase was to get an understanding of the problems related to diffusion of e-learning in developing countries (for an illustration of the research strategy, see figure 2.1). Another reason to why we chose an exploratory approach in the first phase was that little had been written about our specific subject of interest, and as such an exploratory approach was suited (Oates, 2006; Bryman & Bell, 2011). This was also coloured by an inductive approach, as we set out to collect as much rich and detailed data as possible. Based on what we collected we created guidelines regarding diffusion of e-learning to and within developing countries, as such we used our data to create a theory, which according to Bryman and Bell (2011), is described as an inductive approach.

In the second phase our focus changed from being exploratory as we now had gathered information about our subject, and based on that created a set of preliminary guidelines. In this phase our approach also changed from being purely inductive to being deductive, as the aim now was to test our created theory. The preliminary guidelines acted as hypotheses that we tested against existing theories and through an empirical test. Bryman and Bell (2011) describe that with a deductive approach theory is used as a base when the researchers draw conclusions, i.e. our own created theory. This was exactly what the aim of the last phase was, to see if we could get confirmation about our created theory from existing theories about what we had created inductively. In this last phase we also performed an interview with a person that represents the donor side. The aim of this interview was to present our findings and get his opinion on them, based on his experiences with diffusion projects. After that the next step of the study was to create the final guidelines in accordance with what we had gathered during our last interview combined with theory about the area, and to perform a discussion about our result and its contributions to existing theories.
2.3 Research process

The first part of our research process was to start discussing about what we wanted to research, which lead to us starting to discuss different relevant areas that we found interesting. After getting an idea about what we wanted to base our research on, we started to gather information about it to create a better understanding about the area and to be able to get an idea about what we really wanted to study. To begin with we examined the relevance of the chosen research area by studying various articles and identifying trends. By doing so we identified that there was a genuine interest of the chosen area. This led to us starting to gather information about previous research to get a clearer picture of what had been done and not been done within the area. The collection of data regarding previous research was done by using Summon (a search engine for articles, books, theses etc, available at the University of Borås’ website) and Google Scholar. The keyword used were: ‘e-learning’, ‘eLearning’, ‘e learning’, ‘IBT’, ‘Internet-based training’, ‘CBT’, ‘computer-based training’, ‘digital divide’, ‘bridging the digital divide’ and ‘ICT’. All these keywords were used as separate keywords as well as in combination with the keywords ‘developing countries’, ‘challenges’ and ‘possibilities’.

This literature review about previous research led to a greater knowledge about what had been done within the research area, but also about what the area lacked. This made it possible for us to get a clearer picture about the scope of the study and it made it possible for us to define the purpose and research questions of the study (for an illustration of the research process, see figure 2.2).

The next step of the research process was to create a theoretical framework to further increase our knowledge about the area, as well as giving guidance when we created our interview guides and the connected interview questions. The theoretical framework also acted as a base for the theoretical validation which stressed the importance of gathering
information about relevant theories and to include theories that could help us validate the findings. To gather the theories for our theoretical framework we used the knowledge that we had gained from performing the literature review. Based on that gained knowledge we chose theories that had been included in some of the previous research as well as adding new theories as our area of interest did lack some in previously performed research. The theories were collected by using various search engines and databases on the Internet, mainly through the use of Summon and Google Scholar. To gather the required knowledge about the theories, we also used books as a compliment to the electronic data sources.

After the theoretical framework for our study had been created, we created interview guides and questions based on the knowledge gained from the included theories together with the purpose and research questions of our study. The interview guides was created with the situation of each case in mind, and as such the interview guides for our different cases and persons differed from one another; persons with the same position got the same questions, but the questions differed between positions. This was an important aspect for us as it made it possible to get a deeper understanding of how the different people in the cases had perceived the usefulness of the diffusion projects that they had been involved in. This is something that we believe would have been more difficult if the same generic questions would have been used as a base for all interviews.

The next step was to start interviewing different persons from our two cases. These interviews were performed with a range of different persons, that included staff with different positions at the schools, as well as persons that was on the other end of the diffusion projects, i.e. the donors. During these interviews the analysis process started to take shape, as we unintentionally started to analyse what was being said during the interviews, as well as intentionally as we after the interviews started to go through the collected material. When all our interviews had been performed, we started to transcribe and analyze our material further, to be able to compile our material into a workable size to be used in our empirical summary.

After all material had been collected and summarized into a workable size, we started to further analyze the material, with the aim of finding categories and connections between the collected data. This analysis ended up in us creating a preliminary set of guidelines. The next step after the preliminary guidelines had been created was to perform a theoretical validation of the guidelines. To do this we used the theories included in our theoretical framework, to find confirmation or contradictions against the created guidelines. After the theoretical validation had been performed, we conducted yet another interview with a person that had been involved in diffusion projects. This interview used our created guidelines as a base, and a discussion about each question was performed. This was the empirical validation of our findings.

After the validations of the created guidelines had been performed, we started to analyze our findings once again, and this analysis phase ended up with us answering all of our research questions. This was when we created the final set of guidelines, based on the confirmations and contradictions that the two validation test had provided us with.
Figure 2.2: An illustration over the research process
2.4 Research methods

In this section the methods used for collecting and analysing the data used in the study are described.

2.4.1 Data collection

In this section the sampling and data collection techniques used during the study are described. The section also includes a description over the method used for analysing the data.

2.4.1.1 Sampling

Empirical Sampling

As our study was qualitative where we wanted to get descriptive, rich and detailed data, it was vital that the data we got was of high quality. This was one reason as to why we did not want to use random sampling, as we wanted some control over the sampling process. For this reason we conducted a non-probability sampling approach where we picked the people most suited for the study, and that was available to us.

At first we got in contact with a person related to a diffusion project, which is one of the selected cases of the study. This person was a driving force behind the project, and had a lot of knowledge about it. Through this person we came in contact with another person involved in the project that also had a lot of knowledge about the project, but at another level, as he was in charge of the logistics. Through this person we managed to establish contact with a local Rotary club that had been involved in the project and it was through this Rotary club we came in contact with the management of two schools, one of which the project had been performed at. Through the contact at the Rotary club and the directors at the schools teachers that fit the purpose of the study was contacted and selected. The first part of our sampling is a typical example of snowball sampling. This as we started with an initial contact with a small group, who were relevant to the research topic and through them we established contact with other relevant contacts (Bryman & Bell, 2011). The other part of the sampling, after we had been introduced to schools, let us chose respondents from those schools that were most suited for the purpose of our study. This was a purposive sampling, as we ourselves decided the respondents, with the aim of getting deeper knowledge of higher quality about the phenomenon (Christensen, Engdahl, Grääs & Haglund, 2010). This led to us choosing eight different persons, which became the base of the empirical part of the study.

For our last interview, the empirical validation, we let our created theory guide us when choosing an interviewee. We also sought a person with great knowledge about the field, which lead to us choosing a person that we found suitable for the purpose of the validation. As such one could say that we used a purposive sampling combined with a theory driven sampling when deciding on whom to perform the empirical validation on.

As our research approach is mainly qualitative, the above-mentioned sampling methods are well suited, as both are commonly used within qualitative research (Bryman & Bell, 2011; Christensen et. al., 2010).
Sampling of country
One reason for choosing Thailand as the basis for the empirical part of the study was that we managed to come in contact with a person involved in an ICT-diffusion project in Thailand. The project had been running for several years, which suited the purpose of the study well as it enabled us to get information about both short- and long-term effects of the project. The fact that the project had been running for several years also made it possible for us to study initial challenges and problems as well as problems that arose over time. Another important reason for choosing Thailand as the basis for the study was that Thailand no longer can be seen as a typical developing country. Even though Thailand still have poor living conditions, especially the rural areas, and therefore is seen as a developing country, some of the larger cities, i.e. urban areas, have better living conditions, which means that there is a large gap within the country. As a part of the purpose of the study was to study the diffusion of e-learning within developing countries, Thailand was suited to have as a basis for the study, due to the above mentioned gap that exists within the country. With all above in mind, one could claim that we used a purposive sampling, with some influences from a convenience sampling, when choosing in which country to conduct the study.

Theoretical sampling
When choosing the theories that are included in the theoretical framework of the study we used a type of purposive sampling. This as we decided to chose theories connected to the area we studied, and related to the purpose and research questions of our study. This was an important aspect for us as the theories were used as a base when we created questions in our interview guides, and as such it was important that the theories covered all the areas that we needed information about during our empirical study.

The theories we used in the theoretical validation of our findings was based on the content of the guidelines as it was important that we had theories that were closely connected to the results of the study. By doing so it was possible to use the theories as validation tools, to either confirm or dismiss our created guidelines.

2.4.1.2 Data collection techniques
Theoretical data collection
The data required for the theoretical part of the study was gathered by using various search engines and databases on the Internet (more details about the search engines and keywords used can be found in section 2.3). By using the Internet when collecting the theoretical data, it was possible to get access to research from a broader perspective, as it enabled us to find research from many different parts of the world. In accordance with Bryman and Bell (2011), who argue that the collected material is only as good as the keywords employed in the search process, we used a variety of keywords (see section 2.3) in our search process. This was done to ensure the quality of the material found as well as minimizing the chances of missing any relevant material. The theoretical data collection also included the use of books, e.g. ‘Diffusion of Innovations’ by Rogers.
**Empirical data collection**

As we had decided to perform a case study, the following alternatives to collect the needed empirical data were identified: questionnaire, participant observation, structured interview, qualitative interview and focus group. In accordance with Bryman and Bell (2011) we identified a number of advantages and disadvantages associated with each alternative (see table 2.1).

**Table 2.1: Potential data collection methods for our study**

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Type of data</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Questionnaire</strong></td>
<td>Quantitative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Low cost</td>
<td>• Inflexible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No ‘interview effect’</td>
<td>• No way of explaining a question</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Questions have a specific order</td>
<td>• No possibility to probe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No variation regarding how questions are asked</td>
<td>• Generally low response rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Language barriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ‘False respondent’</td>
</tr>
<tr>
<td><strong>Participant observation</strong></td>
<td>Qualitative</td>
<td>• Close relation to the studied object</td>
<td>• Ethical considerations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible to find hidden data</td>
<td>• Cannot observe the past</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Easier to get data about behavior</td>
<td>• Reactive effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible to find data that is taken for granted</td>
<td>• ‘Observer effect’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Generates ‘real’ data</td>
<td>• Intrusive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Time consuming</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Narrow coverage</td>
</tr>
<tr>
<td><strong>Structured interview</strong></td>
<td>Quantitative</td>
<td>• Possible to explain unclear questions</td>
<td>• No way of probing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible to ask for elaboration regarding answers</td>
<td>• ‘Interview effect’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Variation in answer is ‘always true’</td>
<td>• Socially accepted answers can occur</td>
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<tr>
<td></td>
<td></td>
<td>• Questions have a specific order</td>
<td>• Risk of interpretation errors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No variation regarding how questions are asked</td>
<td></td>
</tr>
<tr>
<td><strong>Qualitative interviews</strong></td>
<td>Qualitative</td>
<td>• Possible to ask follow-up questions</td>
<td>• ‘Interview effect’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible to ask new questions</td>
<td>• Difficult to get knowledge about behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible to get information about things from the past</td>
<td>• Hard to catch information taken for granted</td>
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<tr>
<td></td>
<td></td>
<td>• Possible to generate a deep understanding of a specific area</td>
<td>• Difficult to get a groups opinion</td>
</tr>
<tr>
<td><strong>Focus group</strong></td>
<td>Qualitative</td>
<td>• Permits discussion</td>
<td>• Difficult to analyze data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Many different views on the same subject</td>
<td>• Difficult to organize</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Group effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sensitive subjects can be difficult to discuss in a group setting</td>
</tr>
</tbody>
</table>
As the main approach of the study was a qualitative one, we decided that the quantitative methods questionnaire and structured interview were inappropriate; as they could not provide us with the rich and detailed data we were interested in. We were interested in gaining a deeper knowledge about a specific event i.e. stories, from different persons’ perspective, rather than a broad and general point of view. This led to us deciding that qualitative data would be preferred.

From the remaining alternatives, after some discussion about whether or not it was ethical to use, we identified that participant observation was out of the question. If we had used participant observations it would have included observation of children, and we came to the conclusion that the risk of it leading to ethical problems was too large. When observing you need the consent of the observed people, and this is not an easy task when it comes to children, as it can be a hassle to explain what we as researchers are doing, and getting them to understand what they are agreeing to. Of the two remaining alternatives, we decided that focus groups would be hard to conduct as the study was performed in Thailand, which lead to us having to use an interpreter for all our data collection work. It would have been close to impossible for us to act as a moderator for the focus group due to the language barrier. For a focus group to be able to work for us, we would have been forced to use an interpreter as the moderator. We felt that this was a too great a risk, as it would lead to us having to trust the interpreter to do ‘our’ work and losing control over the data collection process.

The alternative that was left, qualitative interviews, seemed to fit our study very well, as we wanted to collect data regarding different persons’ experiences and view on the outcome of a project and create a deeper knowledge about it. This was in line with Bryman and Bell (2011), who describe that by using qualitative interviews one will get the studied persons point of view, as well as rich detailed answers. Yin (2003) also adds that one of the most important sources of information when conducting a case study is the interview. As such we felt that qualitative interviews would be able to supply us with the right type of data.

Out of the different types of qualitative interviews, we decided that unstructured and semi-structured interviews were the two most relevant as they allowed us to capture both what was verbally said as well as the accompanied reactions and body language. Both unstructured and semi-structured interviews result in data in the form of words and stories, but there are certain aspects that differ between the two (Bryman & Bell, 2011). If the researcher has a rather clear focus before conducting the interviews, Bryman and Bell argue that the semi-structured interview is the preferred one. The semi-structured interview, as opposed to the unstructured interview, uses an interview guide that can help to guide the interview and thereby address more specific issues. In addition to these advantages, we also felt that the semi-structured interview had advantages that were important as the study was conducted in the rural areas of Thailand where the English knowledge is limited. It allowed us to change the way questions were asked in the event of any uncertainties regarding the questions, use follow-up questions and the possibility to ask new questions whenever we felt the need for it. This added a layer of flexibility to the interviews, as it allowed us to gather unplanned information that came up during the
interviews that we would otherwise have missed. In addition to providing us with flexibility it also gave us some 'solid ground' to base the interviews on in the form of an interview guide. This guide also made sure that we got all the data that we needed in order for us to be able to finish the study.

All above-mentioned factors were clear indications that the semi-structured interview fitted our study and its purpose well. We therefore chose to use the semi-structured interview as the main data collection method.

2.4.2 Data analysis

All the conducted interviews were recorded using a Dictaphone combined with written notes taken during the interview (for an illustration of the analysis process, see figure 2.3). After the interviews the recorded data was transcribed word-by-word and combined with the written notes. During the data collection a preliminary analysis was performed, both intentionally and unintentionally. During the interviews we unintentionally started to reflect over the given answers in relation to our theoretical framework, which led to our knowledge regarding the area to get better and better with each interview. After each interview we also intentionally started to analyze the collected material. This was done partly to increase our own understanding regarding the area, as well as minimizing the risk of becoming overburdened by unprocessed data. The latter is a risk that Christensen et. al. (2010) puts emphasis on, as it may lead to a poorly executed and shallow analysis, due to that the researchers can have a hard time to grasp the collected data.

![Figure 2.3: The qualitative data analysis process used in the study (Adapted from Christensen et. al., 2010:298)](image)

The primary data analysis method used in this study was an alteration and combination of the qualitative data analysis methods described by Oates (2006) and Christenssen et. al. (2010). When starting with the analysis process we began with analyzing our different cases separately. This was done to make the analysis process more manageable due to the sheer amount of data we had collected.

When analyzing our data, we started by reading through what we had collected at that point to create a general impression about our collected data. We then, in accordance to what Oates (2006) recommends, started to identify different segments in it. These identified segments were then divided into three themes suggested by Oates (2006). These themes were: ‘data that have no relation to the purpose of the study’, ‘general data that can describe the context of the research to its readers’ and ‘data relevant to the research questions’. By dividing the segments of data into different themes at an early stage, it was possible to focus on the segments of data most relevant to the purpose and research questions of the study. It also made it possible to reduce the amount of data to a
more manageable level and allowed us to shift focus to the data most relevant for our study.

We then started to categorize the data into categories, mainly identified from the collected data. However, the theoretical framework in some way also influenced these categories, as it provided us with an initial guidance regarding on how to categorize our data. With that in mind one could argue that our main approach to categorizing data was inductive combined with some influences from a deductive approach (Oates, 2006).

After the data had been categorized we started to look for patterns between the categories. To do this we printed out the data and started to cut and paste and begun to divide the printed data into categories, as we felt that this would give us a better overview of the data. By doing so we managed to identify different patterns between the categories, and as such create knowledge about how the different data was related to and affected each other. After this step, we set out to discuss about all the categories and the relations between them, and by doing so we managed to identify the key aspects of each case.

After the initial analysis of each case, we performed a comparative analysis to identify patterns and relations between the different cases, i.e. triangulation by comparing data collected from different sources (Oates, 2006). Based on these patterns we created a set of preliminary guidelines. To further strengthen the created guidelines we analyzed the guidelines by validating them against theory as well as against an empirical person involved in diffusion projects in Thailand, i.e. theoretical triangulation of the collected material to further strengthen the quality of our findings (Yin, 2003). The analysis process described above was performed continuously throughout the entire project, and as such it was an iterative process.

2.4.3 Evaluation

In this section the chosen evaluation criteria, used to secure the quality of the study, are presented. In connection with each criterion follows a short description regarding when the criterion primarily were used during the research process.

To establish and assess the quality of the research, Bryman and Bell (2011) argue that it is important that the researchers follow some sets of guidelines, i.e. evaluation criteria. To decide how the researcher can establish high quality in his or her research, the authors describe that it is important that criteria for how this should be achieved are established.

Bryman and Bell (2011) describe that validity and reliability are two common evaluation criteria that are used. However these are mainly used within quantitative research as they often refer to measurement. With this in mind, Oates (2006) argues that they are not suitable for the evaluation of qualitative research. For this reason Bryman and Bell (2011) and Oates (2006) describe that qualitative researchers often use alterations of validity and reliability to evaluate and ensure high quality in their research. In our research we have decided to use a mix of the proposed alternatives to validity and reliability. The following criteria were used to evaluate our research and as such create as high quality as possible: credibility, transferability, internal reliability, confirmability and generalizability.
Credibility
The evaluation criterion of credibility is parallel to internal validity, which can be described as whether or not there is a good match between the researchers’ findings and the theoretical ideas they develop (Bryman & Bell, 2011; Oates, 2006). To increase the credibility criterion Bryman and Bell (2011) argue that it is important to carry out the research in accordance with the canons of good practices. In addition to this they argue that it is important to submit the research findings to the participants to ensure that the researchers have correctly understood the social world that they have studied, i.e. respondent validation. Another aspect described by Oates (2006) is that the evaluation criterion of credibility can be strengthened by the use of triangulation, where multiple sources of data, methods or theories are used.

As we are of the belief that more than one social world exists we found it important to include the evaluation criterion credibility. By doing so we ensured that our findings and our result were as representative as possible to the studied case. As Bryman and Bell (2011) describe it is the credibility of the findings that the researchers arrives at that is going to decide how well it is accepted by others.

The evaluation criterion credibility was used primarily during the inductive phase of the study, but it was also used in the latter phases, as it was important that our validation tests provided us with accurate information.

Transferability
The evaluation criterion of transferability is parallel to external validity. Bryman and Bell (2011) describe that external validity refers to the degree of which the findings can be generalized across social settings and that it can be a problem within qualitative research, or as Oates (2006) describes it: can the findings from one case be transferred to another? Within qualitative research the aim often is to create depth rather than breath within the findings, as such Bryman and Bell (2011) and Oates (2006) describe that one should try to create a thick description. With a thick description the aim is to create rich accounts of the details of a culture. By providing a thick description, Bryman and Bell (2011) and Oates (2006), describe that it is possible to transfer the findings to another milieu.

We chose to include the evaluation criterion of transferability as we were creating guidelines on how to diffuse ICT and e-learning in developing countries based on the study of two cases. With this in mind it was important that our findings and result could be transferred to other settings than the studied one, as the aim of our guidelines was to be general and not specific to our studied cases.

The evaluation criterion transferability is something that we have had in mind and worked towards throughout the entire research process, as it has been an important aspect for us that the study can be transferred to other settings.
**Internal reliability**

Bryman and Bell (2011) describe internal reliability as whether or not, when there is more than one researcher, the members of the research team agree about what they see and hear. We chose to include this evaluation criterion, as we were two researchers that conducted this study. If we were to disregard the risk of not having the same view on our finding, it could get a negative impact on the overall quality of our results and findings. As such we felt that it was a relevant evaluation criterion to use.

The evaluation criterion internal reliability was something that we worked with primarily with during the first phases of the project, to make sure that we shared the same view on what we wanted to accomplish. However it has been something that we have had in mind throughout the entire study, as it has been an important aspect that we have had the same view on what we are trying to study.

**Confirmability**

The criterion confirmability is by Bryman and Bell (2011) described as whether or not the researchers have acted in good faith, and as mentioned by Oates (2006), if the researchers have told enough about the study to judge if the findings flow from data and experiences in the setting they have been collected in. Bryman and Bell (2011) describe that it should be apparent that no personal values or theoretical inclinations have influenced how the research was conducted and the findings derived from it.

The evaluation criterion confirmability was chosen as we feel that it was vital that the guidelines and the collected material were as free of personal values as possible. If not it could have had negative effects on the quality of the results of our study, which could lead to unusable guidelines.

The evaluation criterion confirmability is a criterion that we have been working with throughout the entire project, as it has been an important aspect for us that the findings and result are as close to reality as possible, and as unaffected as possible by our personal values and our included theories.

**Generalizability**

Generalizability defines how well the results of the study can be applied to other settings (Bryman & Bell, 2011). Bryman and Bell (2011) describe that it can be difficult to achieve high generalizability in a qualitative study, as the collected data is often generated from a smaller amount of people with the aim of creating depth rather than breath in the findings.

The reason to why we chose to include generalizability was that the aim of the study was to create guidelines that are usable not only within our specific case but in all developing countries, and as such we felt that the evaluation criterion generalizability was important to include.

The evaluation criterion generalizability was used primarily during the last phases of the project, as that was when the focus changed from being aimed at our selected cases to us interpreting the findings to create a result from a more general perspective that can be applied to other countries than Thailand.
3 Theoretical framework

In this chapter our theoretical framework is presented. The theories included are concerned both with IT in general, IT in developing countries as well as with the diffusion and acceptance of IT. The framework will also act the base for a theoretical validation that will be performed on our finding, later in the study.

3.1 The subject areas’ role in the study

The theoretical framework is divided into four subject areas: *IT and developing countries*, *Diffusion of IT*, *IT-supported learning* and *learning theories and rural areas*. The reason for including these subject areas is to present the reader to the research area as well as giving us a solid ground to base the study on, especially since the theories, i.e. the subject areas, acted as a base when creating the interview guides. The subject areas were also included to act as a base when performing the theoretical validation, and as such subject areas, and relevant theories within those areas, connected to the diffusion of e-learning as well as IT and its effects and relation to developing countries were included.

As the study has been conducted with an inductive research approach, the theories included in the theoretical framework have played a minor role when answering the research questions. The theories have instead acted as important input when creating the interview guides as they made sure that no important aspects were left out. Figure 3.1 illustrates how the theories, i.e. the subject areas, are linked to the research questions and how they secured that no important aspects were left out when creating the interview guides.

![Diagram showing the relationship between subject areas and research questions](image)

**Figure 3.1**: An illustration over how the subject areas in the theoretical framework are related to the research questions.
3.2 IT and developing countries

This section includes theories related to IT and developing countries. These theories describe how IT can support developing countries, barriers for implementing IT in developing countries, IT-related risks in developing countries and e-learning in developing countries.

3.2.1 ICT for development

Information and communications technologies (ICTs) are believed to have a great potential when it comes to development. ICT are a continuously emerging key tool that supports development activities (Pade-Khene & Sewry, 2012). Blake and Quiros Garzon (2012) agree that ICT supports development activities, adding that there is an increase regarding evidence pointing towards that sound implementation of ICT can benefit development goals. However those benefits are far from reaching those most in need of them. Blake and Quiros Garzon believe that this is due to a lack of clarity regarding theory and practice of ICT for development, also known as ICT4D.

Pade-Khene and Sewry (2012) argue that ICT can provide access to information and knowledge for rural development in developing countries. They believe that ICT have the potential to enhance development activities in combating poverty as an information, communication or knowledge component of virtually every development challenge. Blake and Quiros Garzon (2012) argue that ICT alone cannot improve peoples’ lives, but that it has to be taken into consideration in a broader perspective with strategies specifically tailored to make most use of the tools and techniques in order to fully utilize the potential benefits for human development.

Even though ICT is seen as an asset when it comes to development, Blake and Quiros Garzon (2012) describe that there are multiple complexities at play that has to be taken into consideration in the field of ICT4D. These complexities include ontological, societal and analytical complexities. The authors describe that within these complexities ICT4D ‘boundary concepts’ such as poverty, digital divide and participation exists that defines the space in which theory and practice are created.

Blake and Quiros Garzon (2012) argue that whenever ICT is implemented with development in focus there are multiple human, technical and physical elements and social, economical, political, infrastructural and ecological dimensions that can evolve in an unpredictable way. The authors also argue that while dealing with problems in a discipline-based way our understanding of problems often leads to further fragmentation. This is because a lot of the data about the elements and their interrelationships often is incomplete and the mechanisms of interaction are unknown.

Blake and Quiros Garzon (2012) also describe that when decisions about ICT and development are made, there are multiple actors and groups involved in the decision making. These actors and groups often see development problems and goals differently which can bring conflicting interests regarding ICT and development into the decision making process.
Gomez and Pather (2012) and Blake and Quiros Garzon (2012) argue that a paradigm shift regarding ICT4D evaluation is needed. Gomez and Pather (2012) believe that it is not sufficient to only focus on easily measurable tangible and quantifiable benefits of ICT, e.g. GDP. They argue that the intangible benefits such as empowerment, self-esteem and social cohesion are of greater importance when evaluating the benefits of ICT from a development perspective.

Blake and Quiros Garzon (2012) describe that the capability approach is beginning to make a contribution to the development of theories regarding the impact of ICT on development. The capability approach focuses more on intangibles such as individuals’ capabilities, and takes one step further away from the thought that poverty is all about money. The authors argue that the capability approach is different from other economic approaches to measuring poverty in that it considers the ‘means to achieve’, ‘freedom to achieve’ and ‘actual achievements of individual goals’ as key elements for development. The researchers describe that the capability approach has been used in recent case studies to assess the impact of ICT on the quality of life of people in rural communities e.g. in Uganda.

As described earlier, ICT projects for development often fail to reach those most in need of them i.e. people in rural areas and as such more focus on how that can be achieved is needed. Pade-Khene and Sewry (2012) argue that the different areas that are applied to evaluate an ICT project and the different aspects that structure the evaluation process determine the evaluation of rural ICT projects. Each of these different areas uses a different approach to analyze their respective aspect of a rural project, which leads to the development of results that may build onto other evaluation domains.

Pade-Khene and Sewry (2012) argue that the evaluation of a rural ICT project is performed throughout the entire lifecycle of a project, from project idea generation to post implementation review. As such ICT evaluation of rural ICT projects is a continuous endeavour that encapsulates the different stages of ICT utilization by the targeted groups and individuals in the rural communities. Pade-Khene and Sewry argue that the evaluation of rural ICT projects needs to be sensitive to the rural environment and aspects and therefore especially aware of any social, political, cultural or economic factors that could influence the evaluation throughout the different stages of the rural ICT project evaluation.

### 3.2.2 ICT adoption barriers

Both the diffusion of ICT and e-learning are highly dependant on individuals’ willingness to adopt new technology. It is therefore of interest to include and get a better understanding of factors that can hinder the adoption process.

When implementing ICT in developing countries there are numerous adoption barriers that can hinder the implementation and effectiveness of the project (Manochehri, Al-Esmail & Ashrafi, 2012). Manochehri, Al-Esmail and Ashrafi (2012) describe that ICT can be used to enhance enterprise competitiveness and that many organizations use ICT due to that reason.
Manochehri, Al-Esmail and Ashrafi (2012) have performed a study in which they analyzed the ICT adoption of small and medium enterprises (SMEs) in the private and public sectors of Qatar. One of the factors they investigated was major barriers when it comes to the adoption of ICT. The authors describe that a large amount of the studied firms, with regards to barriers in ICT investments, felt that the one of the biggest barrier and problem was the lack of proper internal IT skills. Another mentioned barrier was the high initial cost associated with the implementation of ICT projects. A third barrier described by Manochehri, Al-Esmail and Ashrafi was the lack of relevant information and advice regarding appropriate and suitable technologies. These were the three major described barriers, but other barriers also existed such as, lack of time to implement ICT solutions, lack of top management support, negative past experiences and government regulations and requirements. Manochehri, Al-Esmail and Ashrafi (2012) argue that the above mentioned barriers is an indication of the need for more training facilities in ICT, that the costs associated with ICT projects are to high in order for developing countries to be able to afford them, and that professional advice and consulting services should be offered for free or at an affordable cost to the businesses.

To get a better understanding of factors that can hinder the adoption process provided important insights for the study. This was important as barriers can affect the diffusion process in a negative way, and the increased understanding therefore provided us with important input when creating the interview guides.

3.2.3 Information system risk management in developing countries

When developing an information system (IS) project there is always high risks associated with the work, even in developed countries. This makes it even riskier for developing countries, where organizations normally are far less established and organized than in developed countries (Bass & Heeks, 2011).

Bass and Heeks (2011) argue that when an educational organization is faced with a situation to develop a large IS project in-house and are not ready for such a project, it is important to manage the project initiation risks. Without a high focus on managing these risks at an early stage the organization run the risk of not being able to start the project at all, or if started it could be at high risk, which could lead to project failure.

Risks that can arise during the project initiation could be organizational, technical, cultural and climate related, strategic alignment and project relationship, financial, project management and quality and performance related (Bass & Heeks, 2011). The authors argue that when an organization is not ready to develop a large IS, given the situation in developing countries, the risks most likely to emerge are organizational and risks related to its culture.

Bass and Heeks (2011) argue that defining risk priorities is extra important when many risk items are found that cannot be handled in parallel. By doing so, the risk items can be handled based on their respective priority level, which can help to minimize the risks of a failed project. Bass and Heeks describe that it is not enough to only prioritize the risks, but that proper work packages or activities need to be designed and implemented in accordance with the risk items.
To effectively handle risks associated with organizational and cultural risk items, Bass and Heeks (2011) argue that it is of utter importance to strengthen the IT unit organization and its staff most responsible of the IS development. The authors describe that risks surfaced in the initiation stages of a project differs from the risks associated with the development and system migration stages, and as such methods for managing those risks also has to be designed.

**Summary of risks:**

- High risks associated with the development of an IS project, especially in developing countries.
- Without a focus on managing project initiation risks at an early stage there is a risk of not being able to start IS projects at all.
- The risks most likely to emerge in developing countries are organizational and risks related to its culture.

### 3.2.4 IT as support for e-learning in developing countries

Another important aspect for our study is how e-learning is used in developing countries today. It is also important to get an understanding of which factors that has to be taken into consideration when implementing e-learning in developing countries.

Many developing countries today have started major ICT initiatives, which include e-government and e-learning to mention a few. These initiatives are designed to boost the adoption of ICT in the country’s public and private sectors as well as creating a knowledge society (Mofleh Wanous & Strachan, 2008).

Pagram and Pagram (2006) describe that many countries, both developed and developing, are rushing towards e-learning to embrace this new learning technology. However they also describe that e-learning is a commonly misused term. The authors argue that e-learning is a catchall term, which covers a wide range of instructional material that can be delivered through CD-ROMs, over local area networks (LAN) or on the Internet. Pagram and Pagram describe that e-learning includes computed based training (CBT), web based training (WBT), electronic support systems (EPSS), distance or online learning and learning tutorials.

Pagram and Pagram (2006) describe that the most common reason behind the rush towards e-learning is the belief that it provides benefits regarding both reduced cost of delivery and better educational outcomes. Pagram and Pagram describe that this has led to education now being sold like any other product on the world market. However due to the fact that it is often expensive to produce e-learning materials it often depends on economies of scale, which leads to a one-size fit them all pedagogy. The authors describe that this leads to that e-learning material produced in developed countries are plugged into developing countries without any thought of modification so that it suits the learning style or culture in the country where it is being used.

Mofleh, Wanous and Strachan (2008) mentions in their study that Jordan is working heavily with adopting different e-solutions, where e-learning is one of the biggest. They describe that the work with the e-learning project started in 2001, but that it as of today still is not finished, and has not been able to deliver its major intended goals.
The study of Pagram and Pagram (2006), which included Thai schools, showed that a lot of the students were positive towards using technology in the education as a whole, but that many of them were against using e-learning as the sole education medium. The authors argue that this stems from the fact that a lot of the Thai culture and beliefs are taught in the classroom, and as such this is something that the Thai people want to preserve.

With the above mentioned in mind Pagram and Pagram (2006) argue that when implementing e-learning in Thailand it should be used as a compliment to the regular education, and not as a replacement. They also suggest that pedagogy should still lead the design of the education and not the technology itself. Another important feature described is that the learners need support regarding both technology and learning in order to be able to fully utilize it.

By including this subchapter it was possible to identify areas of interest that can affect the diffusion of ICT and e-learning in developing countries. The identified areas could then be used as input when creating the interview guides.

3.3 Diffusion of IT

Even though there are multiple innovations belonging to widely different areas, Everett M. Rogers (2003) describes that evidence points towards similar adoption results in various researches made within the area of diffusion. As such a general description of diffusion theory will be described below.

3.3.1 Historical perspective

The theory regarding Diffusion of Innovations can be traced back to as early as 1903 when the French sociologist Gabriel Tarde initiated his research about how innovations are adopted (Rogers, 2003). Rogers describes that Tarde in his research identified that the adoption or rejection of an innovation is a crucial variable in diffusion research and observed that the rate of adoptions of innovations follows an s-shaped curve over time (see figure 3.2).

![Figure 3.2: The s-shaped curve – illustrating how the adoption rate differs over time (Adapted from Rogers, 2003:113)](image-url)
Rogers (2003) describes that in the research performed by Gabriel Tarde the keyword imitation was identified. Rogers argues that the keyword imitation implies that a person can learn about an innovation by observing and copying someone else’s adoption of an innovation. Something that is an indication pointing to that diffusion is a social process, which occurs through human interaction.

Soon after the research of Gabriel Tarde, Rogers (2003) describes that European anthropologists began to initiate research regarding diffusion. These European anthropologists were referred to as ‘diffusionists’ and they were some of the first to use the term diffusion. Diffusionism within anthropology explained social changes within a society, and that it happened as a result of the diffusion of an innovation from its original source. It was believed that an innovation could only come from its original source, and as such it argued against the existence of parallel inventions. This has, according to Rogers, been proved wrong, and as such the diffusionism viewpoint does not have any following today. In contradiction to the shared viewpoint of today, the diffusionists argued that diffusion alone could explain all social changes. Today the shared viewpoint regarding social changes is that it occurs through both invention, the process in which new ideas are identified or created, and diffusion.

From this early anthropological diffusion research, the research has branched out to include numerous of other field, such as sociology, education, communication and marketing and management (Rogers, 2003). Sundén and Wicander (2006) argue that the reason behind this is that diffusion of innovation explains social change, which is a vital human process. Rogers (2003) describes that all these different disciplines to begin with, studied the concept of diffusion in their own way, without any exchange with the other disciplines. This changed in the mid-1960s when the boundaries between these disciplines began to break down.

Until the 1960s, research regarding diffusion had mainly been conducted in the US and Europe, but in the early 1960s the amount of diffusion research conducted in developing countries started to increase heavily (Rogers, 2003). This research was mainly focused on evaluating the impact of development programs in the field of agriculture, but also in the field of nutrition, public health and family planning innovations. Sundén and Wicander (2006) describe that international help organizations nowadays focuses on the diffusion of ICT to developing countries. As an example, the authors mention that the UN system includes several agencies that promote the diffusion and use of ICT in developing countries.

To include the historical perspective of the diffusion theory is an important aspect as it makes it possible for us to create an understanding of how the development within the area of diffusion research has looked like. It also enabled us to get a picture of how far in the development the studied schools have come.
3.3.2 Central components of the diffusion process

As the aim of the study is to create guidelines for effective diffusion of ICT and e-learning, it is important to have knowledge about the key components in the diffusion process.

Rogers (2003) describes that there are four main components in the diffusion of innovations process. These four components are: the innovation, communication channels, time and a social system. All these components can be found in every study regarding diffusion, as well as in every diffusion program or campaign. The meaning of each of the four components will be explained below.

The first component, the innovation, is defined as an “idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003:12). Rogers (2003) describes that the time from the creation or first time use of an idea is irrelevant in regards of it being an innovation or not. He describes that the perceived ‘newness’ of an innovation is what determines how that individual react to the idea. If the idea is new to the individual it is an innovation. However, if a product is perceived as new or not to an individual, does not only involve prior knowledge to the idea. Rogers describes that an individual can know about an idea but has not yet developed an attitude towards the idea, nor adopted or rejected it, and as such it still counts as an innovation for that individual. When studying and analyzing new ideas, Rogers describes that almost all cases have involved technical ideas, and as such the words innovation and technology are often used as synonyms. According to Rogers technology usually consists of two components: hardware and software. A common misconception is that technology only consists of hardware, which can be the case, but it can also consist of only software or a mix between the two.

Rogers (2003) argues that innovations can no longer be handled and analyzed as a unified unit as they have been in the past. The past has shown that some innovations only require a few years to reach a widespread adoption, while other innovations require decades to reach complete use. With this in mind Rogers suggest that it is important to look at individual attributes, regarding how an innovation is perceived by a individual, to be able to explain the adoption rate of an innovation. The attributes are: relative advantage, compatibility, complexity, trialability and observability.

Relative advantage is how an individual perceive the usefulness of an innovation compared to the one it is replacing (Rogers, 2003). The degree of usefulness can be measured in economical terms, but social prestige terms like satisfaction, are equally important. Rogers (2003) explains that the rate of adoption is dependant on how great the perceived usefulness is. Compatibility is described as to which extent an innovation fits the potential adopter in regards of existing values, past experiences and needs. An idea that does not match the norms and values of a social system will be adopted at a slower rate than a matching one. The author describes that for a social system to adopt an idea that does not match its norms and values, a change in the value system are needed, which is a slow process. Complexity is to which extent the idea is perceived as difficult to use and understand. An idea that is complex to understand and use and requires the adopter to develop new skills and understandings, are adopted at a slower pace, than ideas that are less complex to understand. Trialability is described as to which extent an idea can be
tested and experimented on in the environment of the adopters before it is actually adopted. Rogers (2003) describes that if an innovation has a high trialability, the adopting individuals will feel less uncertainty about the idea, because they have the opportunity to learn by doing. Observability is described as to which extent the result of an innovation is apparent to others. The easier it is to see the result of an innovation, the higher the probability is that an individual will adopt the idea. Rogers concludes the discussion about, the above mentioned, perceived attributes by describing that an innovation with high perceived relative advantage, compatibility, trialability and observability and low complexity will be adopted more rapidly than an innovation that does not share the same attributes.

The second component communication is defined as “the process by which participants create and share information with one another in order to reach a mutual understanding” (Rogers, 2003:18). Rogers (2003) describes that diffusion is a type of communication where the content of the sent message is a new idea. The core of the diffusion process is the information exchange where one individual communicates a new idea to one or several others. In its simplest form this process contains an innovation, an individual or unity that has enough knowledge to use the innovation, another individual or unity that does not have enough knowledge to use the innovation and a communication channel that connects the two sources. A communication channel can be seen as how a message from one individual reaches another. Rogers (2003) describes that for the communication to be as effective as possible, the communicating individuals should share as many attributes, such as beliefs, education and socioeconomic status, as possible. Even though Rogers describes that the individuals should share many attributes, he still argues that the ideal is that they share every attribute but the attribute regarding the innovation. Rogers explains that this is difficult to achieve in reality, as knowledge and experience with an innovation often are related to e.g. socioeconomic status and education.

The third component time is an important variable because it is involved in the innovation-decision process, by which an individual passes from having knowledge about an innovation to adopting or rejecting it (Rogers, 2003). Time is also involved in the process in which an innovation is adopted within a system, as it indicates the adoption rate of an innovation in a social system.

Within the innovation-decision process, Rogers (2003) have conceptualized five steps: knowledge, persuasion, decision, implementation and confirmation. Knowledge is gained when an individual knows about an innovation and has some understanding of it. Persuasion is gained when an individual creates a negative or positive attitude towards the innovation. Decision occurs when an individual takes action regarding the innovation, by either adopting or rejecting it. Implementation is when an individual puts the innovation into use. Confirmation occurs when an individual seeks confirmation in the decision made regarding an innovation, to confirm that the choice to either reject or adopt was the right one.

Rogers (2003) define different adopter categories based on to which degree an individual is earlier to adopt an innovation than other individuals within the same system. These adopter categories include: innovators, early adopters, early majority, late majority and laggards (for more details about the different adopter categories, see table 3.1).
Table 3.1: The different adopter categories (Rogers, 2003)

<table>
<thead>
<tr>
<th>Adopter category</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovators</td>
<td>Innovators are the first individuals of a social system to adopt an innovation. Innovators are characterized by having great interest in new ideas and are willing to take risks.</td>
</tr>
<tr>
<td>Early adopters</td>
<td>Early adopters have the highest degree of opinion leadership in the social system. Early adopters are considered to be ‘the individuals to check with’ regarding innovations, and can be seen as role models as they often provide other adopter categories with advice and information about innovations.</td>
</tr>
<tr>
<td>Early majority</td>
<td>Early majority adopts new ideas just before the average member of a social system. They are positioned between very early and relatively late, which makes them an important link in the diffusion process.</td>
</tr>
<tr>
<td>Late majority</td>
<td>Late majority are individuals that adopt new ideas just after the average member of a social system. Late majority face innovations with skepticism and caution, and do not adopt them until the majority of the social system have done so.</td>
</tr>
<tr>
<td>Laggards</td>
<td>Laggards are the last individuals in the social system to adopt an innovation, and possess almost no opinion leadership. The point of interest for laggards is the past and they often face innovation with suspicion.</td>
</tr>
</tbody>
</table>

The third way, in which the time dimension is involved in the diffusion of innovations, is the rate of adoption. Rate of adoption is the time it takes for an innovation to be adopted by members of the social system. Rogers (2003) describes that the rate of adoption often follows an s-shaped curve (see figure 3.2). Rogers argues that the shape of the s-curve can look different regarding the steepness, because the rate of adoption differs from innovation to innovation.

The fourth and last component, *social system* is defined as “a set of interrelated units that are engaged in a joint problem solving to accomplish a common goal” (Rogers, 2003:23). Rogers (2003) describes that diffusion occurs within the boundaries of a social system. The author mentions that every social system has a social structure, and that the social structure affects the diffusion of an innovation in several ways. It is this structure that gives stability to a system, and by analyzing the structure, Rogers argues that one can find regularity and stability regarding the human behaviour of the system. Rogers describes that one aspect of the social structure is norms, which is the established behaviour patterns for the individuals in the social system. He argues that norms play an important role regarding the adoption rate of an innovation, and that the norms of a system can be a barrier to change.

Rogers describes that within a social system, different individuals are able to affect the members of the systems attitude towards an innovation at different levels. The average members of a system have very limited possibilities to influence the attitudes towards an innovation. However, Rogers describes that there are certain individuals, referred to as opinion leaders, which are able to affect the other members of the system in an informal way. Another type of individual that are able to influence the members of its system is the change agent. A change agent attempts to influence the members’ attitude towards an
innovation in a desired way, decided by a change agency. Rogers describes that the social system influences the diffusion of innovations in yet another way. The innovation can be adopted or rejected by the entire system, or by certain individuals. When an innovation is adopted by an entire system, the decision can be either collective or made by an authority. Rogers argues that every innovation affects the social system in one way or another, as the changes affects the individuals as well as the system itself. Rogers describes that there are three different classifications of consequences: desirable versus undesirable, direct versus indirect and anticipated versus unanticipated.

To have knowledge about the key components in the diffusion process is important as the diffusion of ICT and e-learning to developing countries fundamentally are diffusions of innovations and therefore share the same characteristics. Knowledge about the key components makes it possible to get a clear picture of which and how different factors affect the diffusion process.

3.3.3 Challenges regarding the diffusion of IT
When creating guidelines for an effective diffusion of ICT and e-learning it is important to have a clear view of challenges related to the diffusion process in general. This because both the diffusion of ICT and e-learning are concerned with the diffusion of new technology, which makes them resemble each other and share many characteristics with the diffusion of an innovation.

Rogers (2003) describes that it is easy to believe that the diffusion of IT is a fast and effortless process as there are many obvious advantages with new technology; however this is not the case. The reason to this is that new technology requires a change in ones behaviour, and it is a time consuming process, as it requires a good amount of learning and time to be able to fully utilize the benefits of the technology. He mentions that it is not always only the individual adopting the technology that has to put effort into learning the adopted technology. The learning process often involves the need of guidance from another individual as it can be close to impossible to learn everything about a new technology on your own. It is therefore important that the right amounts of resources are available to support the learning process, as it is critical for the new technology to be fully adopted and utilized.

One of the technologies described by Rogers that requires a great deal of effort to master is the diffusion of computers. A barrier described by Rogers, that can hinder the adoption of computers, is that individuals often feel insecure and anxious regarding computer usage. This is negative, as anxiety towards computers makes it harder for the individuals to learn on their own, as they then tend to be afraid of elaborating with the computer freely. This anxiety often removes the fun part from learning about computers, which can have a negative impact on the learning process. Rogers suggest that to allow individuals to play games on the computer may be an effective way towards creating a better understanding regarding how to use a computer. Rogers argues that it is unlikely to increase the computer usage only by handing out computers; he claims that training also needs to be provided for it to increase.
Rogers describes that another important aspect regarding the diffusion of IT to keep in mind is that even if only a few individuals within a social system with a negative attitude towards an innovation exist, difficulties can still occur. This is due to the fact that these few individuals may act as opinion leaders within the social system and therefore also have a greater informal power and ability to affect the other members. The author therefore describes that it is important to catch these specific individuals and change the mindset of them. Otherwise there is a risk that a lot of effort and time is spent on individuals with less possibility to influence how other individuals of the social system perceive the innovation. As a result of not identifying the right individuals within a social system, there is a risk that a lot of effort and time is put into an innovations diffusion process, without it achieving the desired effect.

The identification of challenges regarding the diffusion process is an important aspect to consider as they provided us with useful input when creating the interview guides. They also make it possible to match our findings against existing theories in a later stage when performing the theoretical validation.

3.3.4 Technology Acceptance Model
The Technology Acceptance Model (TAM) is included in the theoretical framework because both TAM and the diffusion of ICT and e-learning are concerned with individuals’ adoption of new technology. One can therefore argue that the diffusion of ICT and e-learning in many ways resembles the implementation of a new information system. Another important reason for including TAM in the theoretical framework is that it complements Rogers’s ‘Diffusion of Innovations’ by providing additional factors regarding individuals’ behavioural intentions to adopt new technology.

The Technology Acceptance Model (TAM) is a model used for modelling user acceptance of information systems (Davis, Bagozzi & Warshaw, 1989). Davis, Bagozzi and Warshaw (1989) describe that the aim of TAM is to provide an explanation of the determinants of computer acceptance in general, capable of explaining user behaviour over a broad range of end-user computing technologies and user populations, while at the time being theoretically justified. The authors argue that one key purpose of TAM is to provide a basis for tracing the impact of external factors on internal beliefs, attitudes and intentions, making it possible to identify why a particular system may be unaccepted and pursue appropriate corrective steps.

TAM posits that perceived usefulness and perceived ease of use are two beliefs that are of primary relevance for computer acceptance behaviours (Davis, Bagozzi & Warshaw, 1989). Perceived usefulness is described as the prospective user's subjective probability that using a specific system will increase his or her job performance and perceived ease of use is described as the degree to which the prospective user expects the system to be free of effort. The authors explain that TAM postulates that computer usage is determined by a persons’ behavioural intention to use, which in turn is jointly determined by the person's attitude towards using the system and perceived usefulness (see figure 3.3).
Figure 3.3: TAM – illustrating how the determinants that affect individuals’ behavioural intentions to use a system are interrelated (Adapted from Davis, Bagozzi & Warshaw, 1989:985)

The original TAM was created by Davis, Bagozzi & Warshaw in 1989. However in this study we use an extended version of the model created by Venkatesh and Bala in 2008 (see figure 3.4), often referred to as TAM 3.

The reason for choosing the extended version is due to the rapid development within the area over the last two decades. The extended version therefore seems more suited for our study as it takes additional determinants, which are highly relevant today, into consideration.

In the extended version of TAM, Venkatesh and Bala (2008) have added Subjective Norm, Image, Job Relevance, Output Quality, Result Demonstrability and Perceived Ease of Use as determinants of the perceived usefulness (for more details see table 3.2). The authors describe that the two first determinants can be categorized as social influence while the other four are system characteristics.

Table 3.2: Determinants of perceived usefulness (Adapted from Venkatesh & Bala, 2008)

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Perceived Ease of Use</td>
<td>The degree to which a person believes that using IT will be free of effort.</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>The degree to which an individual perceives that most people who are important to the individual think that he or she should or should not use a system.</td>
</tr>
<tr>
<td>Image</td>
<td>The degree to which an individual perceives that use of an innovation will enhance his or her status in the social system.</td>
</tr>
<tr>
<td>Job Relevance</td>
<td>The degree to which an individual believes that a system is applicable to his or her job.</td>
</tr>
<tr>
<td>Output Quality</td>
<td>The degree to which an individual believes that a system performs his or her job tasks well.</td>
</tr>
<tr>
<td>Result Demonstrability</td>
<td>The degree to which an individual believes that the results of using a system are communicable, tangible, and observable.</td>
</tr>
</tbody>
</table>
Figure 3.4: TAM 3 – an extended version of TAM that introduces additional determinants of perceived ease of use and perceived usefulness (adapted from Venkatesh & Bala, 2008:280).

In their model, Venkatesh and Bala (2009) have also introduced two moderators, *experience* and *voluntariness*. These two moderators are personal factors that have impact on many of the other determinants (see figure 3.4).

In the extended version of TAM the authors also introduces *Computer Self-Efficacy*, *Perception of External Control*, *Computer Anxiety*, *Computer Playfulness*, *Perceived Enjoyment* and *Objective Usability* as determinants of the perceived ease of use (for more details see table 3.3).
Table 3.3: Determinants of perceived ease of use (Adapted from Venkatesh & Bala, 2008)

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Self-Efficacy</td>
<td>The degree to which an individual believes that he or she has the ability to perform a specific task using a computer.</td>
</tr>
<tr>
<td>Perception of External Control</td>
<td>The degree to which an individual believes that organizational and technical resources exist to support the use of a system.</td>
</tr>
<tr>
<td>Computer Anxiety</td>
<td>The degree of an individual’s apprehension, or even fear, when he or she is faced with the possibility of using a computer.</td>
</tr>
<tr>
<td>Computer Playfulness</td>
<td>The degree of cognitive spontaneity in computer interactions.</td>
</tr>
<tr>
<td>Perceived Enjoyment</td>
<td>The degree to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use.</td>
</tr>
<tr>
<td>Objective Usability</td>
<td>A comparison of systems based on the actual level, rather than perceptions, of effort required to completing specific tasks.</td>
</tr>
</tbody>
</table>

To include TAM in the theoretical framework made it possible to get a greater understanding of factors that can affect individuals’ intentions to use new technology. This was an important insight as it made it possible to identify areas important for the diffusion and adoption process.

3.4 IT-supported learning

In this section theories related to how IT can support learning are presented. The section begins with theories related to IT-supported learning in general and as the section progresses the focus is changed towards IT supported learning in rural areas.

3.4.1 Historical perspective

In this chapter the historical development of IT-supported learning is presented in chronological order (see figure 3.5). To include a description of the historical development is important as it provides a clear view of how the use of IT to support learning have changed over the years. This contributes to the study as it makes it possible to identify how far in the development the studied schools have come.

Figure 3.5: How IT-supported learning has developed over the years (Adapted from Leinonen, 2005)

White (2005) describes that until in the middle of the 1980s, computers were only used in education as standalone-machines. At this time the computers acted as tutors, which meant that they learned the learner. The computers were for example used in combination
with different programming languages to instruct the computer to perform specific tasks. White describes that the application used for supporting education were of drill and practice character, which meant that the learners learned things by heart instead of getting deep understanding.

Even if the first computer network, ARPANET, a large wide-area network that connected universities in the US to each other, had been around since 1969, it was not until in the late 1980s that it was possible to connect personal computers to each other (White, 2006). White describes that this led to great changes for IT-supported learning as it at that time became possible to share files like pictures and text documents via networks. These network activities were often conducted within the walls of one room, which lead to the construction of special computer labs in primary school, secondary schools and universities. White (2006) describes that at this point, computers were able to fill several different functions in the education; they were for example able to fill existing knowledge gaps, test ideas and help to decrease students’ workload. The applications used in education during this period supported for example simulation, modelling, network printing and file sharing.

Leinonen (2005) describes that when computers with advanced graphics and sound started to spread to the great masses in the late 1980s, voices were raised about the lack of efficiency with the drill and practice teaching, which was associated with IT-supported learning at this point. These voices argued that students could learn more if they were able to look at coloured animations and small video clips and then do exercises. Leinonen explains that during this period, CD-ROMs was used as the main source for delivering learning material and that the pedagogical visions was characterized by the fact that all persons are different and learn in different ways. Leinonen (2005) claims that this was something that also was reflected in the IT-supported learning by giving students the opportunity to chose between watching a video clip or a still picture, depending on the need. Some influences from the drill and practice teaching remained during this period, but its role was now to check that the students really learned what the computers tried to teach.

The third wave of the IT-supported learning hype arose when the Internet was launched in the early 1990s (Leinonen, 2005). Leinonen argues that one great advantage, when learning material was delivered through Internet instead of on CD-ROM, was that the Internet made it possible to continuously keep the learning material up-to-date. Leinonen describes that the main problem was that the Internet still was immature at this stage and it was therefore not possible to show multimedia material but only text and pictures. He describes that this made the delivered learning material very inefficient as students found the learning material difficult to absorb and learn from.

In late 1990s, the Internet-based training had gotten more mature and the term e-learning was coined for the first time (Leinonen, 2005). Leinonen describes that the e-learning hype started when different websites, articles and companies started to mediate that e-learning was the next big thing, to almost everyone that had something to do with education. Educational experts started to ask IT managers at schools to come up with e-learning solutions. The IT manger then took help from companies, who started to create e-learning solutions even though it was not proven that anyone needed the products. The
author describes that this can be seen as the beginning of both the Learning Management Systems (LMS) market and the market for e-learning courses. The pedagogical thinking around e-learning was closely related to CBT, as the point was to deliver courses for students (Leinonen, 2005). Leinonen describes that LMS developers had become more aware of that learning requires social interaction between students as well as between students and teachers. Despite this most of the user interfaces in these systems were design in a way that students first should read the instructions that the system gives and then if something is unclear, ask other students or teachers. Leinonen (2005) explains that the e-learning field today has become so wide that it is hard to say which pedagogical thinking that is behind it. Leinonen claims that e-learning no longer is one, but that all paradigms described earlier (e.g. IBT and CBT) instead lives inside the concept of e-learning.

Brown and Adler (2008) describe that the latest evolution of the Internet, Web 2.0, has blurred the boundaries between customer and producer and changed the focus from access to information to access to other people. The authors describe that networking sites, wikis and virtual communities has made it possible for people with common interests to meet and share ideas. The authors therefore mean that Web 2.0 have created a new type of participating media which is ideal for supporting different types of learning.

Brown and Adler (2008) describe that one great advantage that the Web 2.0 have brought is the ability to support different aspects of social learning. Social learning is based on the premise that the understanding of content is socially constructed through conversations about the content with others and it does not place much weight on what students learn but instead on how they learn and focuses on learning activities and human interaction instead of on the content of a subject. Brown and Adler (2008) describe that there has been research made which indicates that students’ performance are dependent on their ability to form or participate in small study groups. One of the great advantages with social learning is therefore that it allows students to ask questions to other students in the group to clarify areas of confusion, compare answers in the study material with other students in the group and take on the role as a teacher and help the other students in the group to understand. Through this, social learning helps students to create a deeper understanding through social interaction with other students.

Brown and Adler (2008) describe that virtual classrooms, where students get the opportunity to create their own small study groups and interact with each other through Internet based platforms are the latest trend in IT-supported learning.

By including the historical perspective to the theoretical framework it was possible to identify how far in the historical development the studied schools had come. It also made it possible to identify potential development stages that schools can strive towards, as well as possible difficulties that may arise in the future if, or when, the schools get more developed.
3.4.2 How can IT support learning?

In this chapter two different types of IT-supported learning techniques are presented. These techniques are examples on how IT can be used to support the learning process.

3.4.2.1 Blended e-learning

Blended e-learning is a mix of classroom (face-to-face) and online learning (Siemens, 2004). Siemens describes that blended learning provides the best opportunities for learning transition from classroom to e-learning and that the method is effective as it adds efficiency to classroom instructions and allows increased discussions or information review outside the classroom. Lating (2009) argues that blended learning allows organizations to move learners from traditional classroom learning to Internet learning in small steps, which makes the transition easier to accept. Lating describes four directions of blended learning that is common in practice:

1. To combine or mix modes of web-based technology (e.g. virtual classroom, streaming video) to achieve educational goals.
2. To combine pedagogical approaches (e.g. constructivism, behaviourism) to create an optimal learning outcome with or without instructional technology.
3. To combine any form of instructional technology (e.g. CD-ROM, Web-based training) with traditional face-to-face training.
4. To combine or mix instructional technologies with actual job tasks to create a harmonious effect of learning and working.

Siemens (2004) argues that blended learning combines the best of classrooms with the best of Internet learning.

3.4.2.2 Hybrid e-learning

Lating (2009) defines hybrid e-learning as e-learning where the main course delivery platform is the interactive multimedia CD-ROM. Lating describes that this learning model is for learners who have no computer access at home or in the community where they live. This means that the learners only have access to computers at campus or in their schools, which leads to that traditional face-to-face classroom learning always remains a permanent feature in hybrid e-learning. Lating (2006) argues that by allowing computer-based training, Internet-based training and the traditional face-to-face classroom learning to co-exist, hybrid e-learning is a suitable model for rural, poor schools that are financially constrained.

3.5 Learning theories and rural areas

In this chapter theories related to rural areas are presented. The chapter begins with a general approach and then becomes more specific towards IT and rural areas.

3.5.1 Participatory rural appraisal theory

The participatory rural appraisal theory can be applied to research conducted in rural areas in developing countries (Lating, 2009). By using a participatory action research, Lating (2009) argues that the researcher puts the capabilities in the hands of the deprived and disenfranchised people. By doing so the researcher enables the people themselves to be a part of the change/transformation of their lives.
Lating (2009) describes that Paulo Freire, a renowned scholar and liberation theologian, believed that the poor and exploited people can and therefore should be enabled to analyze their own reality. Lating argues that one should try to change the mindset of the poor and exploited people so that they can get a liberated mind. Lating argues that an unliberated mind is one that expects that others have to provide information and services for it to consume.

The deconstruction of the mind is according to Lating (2009) important because the state of the mind influences how information is processed. Consequently, Lating describes that the deconstruction of a community is equally important, because it enables an entire community to embrace internal government policies and programs. By doing so it is possible for the entire community to be prepared to embrace an implementation of such a program. With this in mind Lating (2009) argues that one should not underestimate the local knowledge of the indigenous people living in the rural areas.

3.5.2 How can IT support learning in rural areas?

Another important aspect to include in the theoretical framework is how IT can be used in rural areas to support learning. This is important because it can provide useful input to the later stages of the study.

E-learning is believed to have a huge potential in developing countries, facing an escalating shortage of teachers as a result of a growing demand for education (Williams & Eyo, 2011). Williams and Eyo describe that e-learning is a cheaper and more flexible way to educate compared to traditional education and that it therefore can be seen as a tool for raising the numbers of students possible to educate, especially in rural areas.

Nayak and Kalyankar (2010) argue that IT integration in education is important early in life because it offers opportunities to strengthen several aspects of early childhood education practice. These aspects include (1) opportunity to support and enhance children’s learning and playing experiences (2) support and strengthen learning and development and (3) support and strengthen relationships and communication between parents and people connected to early childhood education setting.

Nayak and Kalyankar (2010) describe that e-learning can be a good education alternative for rural areas as it is cost effective. They argue by using e-learning in rural areas cost can be reduced because e-learning environments are less expensive to produce and distribute and because it enables e.g. standardization, resource sharing and increased productivity. The authors also claim that e-learning can make management and administration easier by facilitating the distribution of learning, training, learner support and general administration.

This section provided important input to the study regarding positive effects that the introduction of IT in rural areas of developing countries can have.
3.5.3 What challenges regarding IT supported learning exists in rural areas?

Even though e-learning is believed to be able to create benefits for developing countries, Andersson and Grönlund (2009) and Williams and Eyo (2011) argue that there are multiple challenges related to the implementation of e-learning. Andersson and Grönlund (2009) describe that when implementing e-learning in developing countries there are challenges related to the course itself, challenges related to the characteristics of the individuals, to technology and to the context itself. Challenges related to each of these areas are described below:

**Course**

Within the context of course challenges, Andersson and Grönlund (2009) and Lujara (2010) argue that the curriculum in some cases can be an issue, as it is often developed without e-learning in mind. This is important as e-learning differs from traditional classroom based learning in many ways (Andersson & Grönlund, 2009). The authors also argue that the more instructor centred pedagogical approach used in developing counties can be a concern as it might not be suited for e-learning as it demands a more learner oriented approach. Another challenge described by Andersson and Grönlund (2009) is the delivery method of the course itself. For an e-learning course to be effective it is important to find the right level of flexibility that suits the specific students. Andersson and Grönlund (2009) and Williams and Eyo (2011) claim that it is important that the content of the course considers religious beliefs, uses local language, have relevance for a local setting and match the local needs. It is also important to design the course with regards of the local culture to avoid confusion or offensiveness towards it. Lastly in regards to the course, Andersson and Grönlund (2009) and Williams and Eyo (2011) argue that it is important to support both students and teachers. By doing so students will feel less confused, and the teachers will feel more motivated in their work, which can lead to better support for the students.

**Individual**

Andersson and Grönlund (2009) describe that the motivation of a student is an important factor. If a student feels unmotivated the risk of failure increases because e-learning usually focuses on a more learner oriented approach, which requires a greater individual responsibility. Williams and Eyo (2011) argue that an important challenge to overcome is to keep the costs of the implementation of e-learning at a level that is affordable by developing countries and its inhabitants. Andersson and Grönlund (2009) argue that the technological confidence of people in developing countries can be a challenge. The authors describe that having access to the technology is not enough. Students also need the required computer skills and to feel confident in using computers. The fact that people in rural areas within developing countries often have limited access to IT and as such limited experiences with computers, can be a major hindrance for learning. Andersson and Grönlund describe that this is especially evident with students that are entirely new to computers.
Technological
Andersson and Grönlund (2009) describe that when implementing e-learning in developing countries issues regarding the choices of technologies, the cost of using the technologies, and how and in which language they are accessible exists. Andersson and Grönlund and Lujara (2010) argue that access to technology is an important factor. A challenge can be that people in developing countries have low or no access to the technology, but also, if they have access, that it can be very unstable and unreliable. Williams and Eyo (2011) and Lujara (2010) describe that the existence of an infrastructure and some degree of connectivity is important for e-learning to succeed in developing countries. The authors argue that this technical constraint is something that has to be overcome. With this in mind, Williams and Eyo argue that a key challenge in order to increase the participation of developing countries in e-learning is to keep the technological requirements at a minimum. Williams and Eyo and Lujara (2010) also describe that the electrical supply in developing countries often are very unreliable, which can create problems. Another important factor, described by Andersson and Grönlund (2009), regarding technology is the costs of it, as in developing countries the resources are often limited. As such affordable and low-cost ICT solutions need to be delivered. Andersson and Grönlund describe another challenge, localization as the importance to think about to what extent the technology and software should be adapted in order for it to fit local culture and languages. The authors argue that it is important to embed cultural and religious values and aesthetics into the design of the technology and software.

Context
Andersson and Grönlund (2009) describe that societies contains many values and beliefs that can have impact on education. One factor identified by Andersson and Grönlund is the relationship between teacher and student. The authors describe that in many countries students are taught to show respect to those older and that teachers are regarded as experts that cannot be questioned. Andersson and Grönlund argue that it can be a challenge to diffuse e-learning to cultures where learners only acts as receivers. In these cultures the students are very dependent on the teacher and are used to being spoon-fed, something that is a known obstacle to e-learning. This can make the students feel uncomfortable when forced to abandon the traditional instructor-led learning style. Andersson and Grönlund (2009) also describe that other actors within a society can affect the adoption of e-learning. If the attitudes of the decision-makers are negative towards e-learning, it can hinder the overall adoption of e-learning within that country.

When designing guidelines it was important to have an understanding of the challenges that can exist in developing countries. These insights were important for the study as they provided important input when creating the interview guides, as well as when performing the theoretical validation on the finding.
3.6 Concluding remarks regarding the theoretical framework

First of all, the theoretical framework has helped us to create a fundamental understanding of the chosen research area. To gain this understanding was of utter importance for the continuing research process as one of the primary purposes of the theoretical framework was to act as a foundation and provide guidance when designing the interview guides. A well developed theoretical framework that covered many different aspects minimized the risk of us missing out on important information during the interviews. Another reason to why the framework was important was that the aim of the study was to create guidelines for effective diffusion of ICT and e-learning, something that was depending on us having good understanding of the area and not missing out on any important aspects. We also felt that the fact that the chosen research area was relatively unexplored further strengthened the importance of forming a theoretical base that helped us orient in the area to get a clearer view of how our research could contribute to and complement existing research.

The theoretical framework has provided us with knowledge and important insights both regarding ICT-related aspects in general but also aspects specifically related to the rural areas of developing countries. We have gained knowledge regarding both why the research area is important when it comes to helping developing countries develop and reducing the digital divides, enabling aspects that can help ease the diffusion process but also important aspects that can hinder and affect the diffusion process in a negative way. The fact that we have created this broad understanding, from many different angles, of the research area also acted as invaluable input when designing the interview guides.

The theoretical framework is also important for our continued research as it will enable us to perform a theoretical validation on our findings to investigate whether they match or differs from theory. This is an important step in our research process as it will help us to further secure the quality of our findings.
4 Empirical study

In this chapter, compilations of the 8 semi-structured interviews, conducted during our empirical study, is presented. The chapter begins with interviews conducted with two persons that have been involved in a diffusion project, followed by three interviews conducted with members of the staff at school A and ends with the presentation of three interviews with members of the staff at school B.

4.1 Donors

This section contains summaries from the interviews conducted with two of the persons involved in a project that donates computers to schools in Thailand. In these interviews they describe their experiences from the project, from their point of view. The project was a Rotary driven project that donated old and refurbished computers to schools in the rural areas of Thailand.

4.1.1 Interview one - Project initiator

The first interviewee, DH, is a westerner and the man behind the project. His part in the project has been to talk with different donors and to make sure that the computers have high enough standard to be sent to the schools. He has also been conducting the repairing and upgrades of the computers.

When asked about the background to the project, DH describes that he got the inspiration from another project, and he felt that he wanted to do something alike, but with computers instead. He describes that the first set of computers he got were from customers that he had been working with. Those customers had old computers that they would dispose of so they decided to donate them to DH. In 2005 when the project started he set up a goal to deliver 100 computers, but this proved to be harder than he first anticipated. A lot of the computers were in a bad condition, so to reach 100 computers he had to ask around for computers. When donating computers to schools, DH describes that he feel that it is no use to only give away one or two computers. He has therefore set up a rule that they give at least five computers with each handout.

The reason to why DH wanted to start the project was due to, as he describes it, his ‘humanitarian vein’. He describes that the country have been kind to him, and he felt that he wanted to give something back, especially since the concept of CSR, which is about giving back to the society, is so common now a days. He describes that people around the world are very into CSR but that the Thai people are very bad at that. For him it felt natural, especially since he is in the business regarding both technology and education.

DH explains that many of the computers that he received were in a bad condition and that he had to ask his Rotary club for money to upgrade and repair them. He also tried to reuse as much hardware, from computers that were broken, as possible. Apart from repairing the computers, he also installed some basic software on them. He decided that they had to run at least Windows XP and Office 2003, regardless of what the computers had installed from the beginning.
Regarding how he found recipient schools, DH describes that after he had received the computers; his Rotary club helped him to find schools that fit his purpose. He focused on schools that his Rotary club knew of, as that would minimize the risk of the schools not being serious about using the computers. He describes that he wanted to make sure that the computers stayed at the schools after he had delivered them. He describes that the schools were poor, and as such he felt that they were ‘worthy recipients’.

In the beginning DH got help from two large logistic companies to distribute the computers to the different parts of Thailand. However these companies were only willing to help him during the first years of the project, which forced him to find another partner that were willing to help. Today DH gets help from another company that provides him with storage space, but not the logistics, so the schools often have to transport the computers to their schools by themselves.

DH describes that when choosing recipient schools, it has been both about pulling and pushing; on one hand they reach out to fellow Rotarians to see if they know of any good schools, or they wait for schools to contact them directly. When a school contacts them, they try to reach out to see if it is possible to get some computers through donations, to refurbish and then send to the schools. DH describes that the way it usually happens is that they say that they have computers, and if a school want them, the school will have to solve the transportation themselves, and also find some money for the upgrades.

DH explains that the project so far has played a bit on the bad copyright laws in Thailand regarding the software that they provide for the computers. He describes that schools more or less have the right to use the software regardless of the authenticity, but that he in the future wishes that a company, for example Microsoft could sponsor the project with software. He thinks that this would be a good solution, as it would give Microsoft goodwill, as he believes that what he is doing is very admirable.

Even though the computers DH has sent to the schools have not been new or top of the line, he describes that his personal feeling is that the effects he wished to accomplish have been reached. He describes that even though they have not done any real follow-ups he has been given some positive feedback about the project, and he knows that the computers are still at the schools, which makes him feel that it has not been a waste of time. Even so he mentions that they could have done a lot more.

DH describes that he did not do any research regarding any of the schools that have been targeted, as he only choose schools that have been targeted by another project. He describes that he thinks that it is important to do proper research on the schools, to make sure that the targeted schools are trustworthy and that they are ‘worthy recipients’. This as it is no use to donate computers to a school that for example have a lot of money and do not have any problems with lack of computers. DH also claims that it is important to do a preliminary investigation about the schools to see what kind of space they have and what they want to use the computers for. If this is not done properly he describes that problems can arise. He for example mentions a governmental project that sent computers to a school that did not have any electricity. Even though it is important, he describes that he himself never have had any direct contact with the schools, instead that has been done through people within his Rotary club.
As mentioned before, DH never had any direct contact with the schools, but from what he have heard, all the schools that they have targeted have been very positive towards his project, and they are satisfied with the computers. He describes that they have been a bit sloppy regarding the follow up process, but even so he feel that it has been OK. DH describes that this is something that he feels could have been done differently though as he claims that one cannot take for granted that what you are doing is working just because it feels right. However, this is something that they more or less have done as they felt that the demand has been so large, so they just assumed that it would work. With this in mind he mentions that there is room for improvement regarding how they have conducted the project. He believes that some kind of ‘train the trainer’ program could be useful so that the teachers can learn how to use the computers to its fullest. He describes that in the long run it is not enough to only supply the schools with computers; they have to be able to use the computers for something as well. An example he gives is that to only have a computer would be like having a TV without any TV-stations. DH believes that his project needs to evolve into something that provides more than just computers.

Even if one has the resources to be able to perform a project, DH describes that the hardest part is to find ‘worthy recipients’. Even though most of the work is done voluntary it is important to be professional about it, which at times can be a challenge. He describes that it is quite common that money end up in the pockets of the wrong people, and as such it is important to make sure that it will not happen. DH mentions that he believes that it is important to demand something in return from the recipients. It might be enough to ask the recipients to send some photos of when they use the computers, as it is important to see that what you have done is being utilized in the right way.

When talking about difficulties that occurred during the project DH mentions that there have been some, but that most of them were on their behalf. He describes that it has been working very well with the recipient schools; they have been very enthusiastic about the computers and have made sure that it worked out well. The problem that has been most common is problems related to the old computers in combination with that he and the other involved parties have their own companies that they have to tend to, so time is an issue. He describes that a common problem is that they promise one thing, but then it turns out that 10 of the computers are not working. Another problem is to find compatible parts, as some of the computers have been very old.

By supplying schools with computers DH believes that he can help a lot. He describes that he believes that a computer room with 20-30 computers can support up to about 20 times the amount of students, which is a major thing according to him. He mentions that at one of the schools that he has been in contact with they have about 600 students that share 30 computers. He describes that he thinks that this is a good indication about that the schools can make things work with small means, so that the students at least can get a few hours each in front of a computer per week. He describes that this is far from optimal though, and mentions that at richer schools students spend at least every other hour behind a computer each day. Even so, he thinks that 30 computers and a couple of hours a week is better than nothing.
DH describes that the project is very primitive and that it is a project that he runs continually but he is not handing out computers all the time. He explains that he restarts the project whenever he hears about a company wanting to donate computers. His wishes with the project are to in the future be able to provide other services in addition to handing out the computers, like providing training solutions and free services for a set amount of time. He mentions that one solution can be that the schools send broken computers to him so he can repair them, or send new working computers. He also describes that a system where he could identify the computers could be useful, as it would make it easier to see if the schools are using them.

DH describes that there are a lot of existing free e-learning materials today both in Thai and in English, and that he is certain that some schools have figured out how to connect the computers into a network and how to get out on the Internet. Even so he believes that some schools still only have computers without any Internet connection or local area network solution. He describes that when all schools have access to Internet they could help them find good e-learning solutions, and that is something that he would like to add to the project.

When talking about general problems at the rural schools of Thailand DH describes that a large problem according is the low English and technological levels at the schools. He also mentions that he believe that the teachers are not good enough, and because of that not even the teachers can speak English. He mentions that a lot of countries that are poorer than Thailand can speak English better due to that their government has understood the need of better education. He describes that many people in Thailand are beginning to realize this problem, but there is still a long way to go. He describes that if you do not make the teachers better, the students will not learn anything; as such he believes that the problem lies within the entire educational system in Thailand.

When discussing difficulties regarding the diffusion of computers to the educational sector DH describes that a cultural problem exists. Many of his customers want to buy new computers, but when they do so they refuse to start using the newer software as they have no wish to change from their old working software. He believes that by reasoning like that the Thai people will not utilize the potential of the technology to the fullest. He describes that he wish that with the help of governmental funding and initiatives the amount of computers at the rural schools will increase.

When talking about the digital divide in Thailand, DH describes that he thinks that it is large. He describes that his feeling is that, even though a lot of things regarding technology have happened in Thailand, the digital divide is increasing. He mentions that this is not only in the poor parts, but that it is in regards of education all over the country. DH describes that a problem in Thailand is the poor technological infrastructure, and it is especially evident in his work where he works as a system integrator. He describes that for example in Sweden the bandwidth per capita on average is about ten times as high as in Thailand. Based on this he describes that he feels that the gap is increasing instead of being reduced. He describes that there are no logical explanation to this, as he feels that there are no technical or physical limitations in Thailand that can explain why that is happening. He feels that it is the people that are in the position to influence this, that are
too greedy and only thinks about themselves. He describes that it is all about politics and personal greed, but this is his personal subjective opinion.

DH describes that he believes that by giving away technology he can open other people’s eyes, and to get them to acknowledge that a problem exists. He describes that by donating computers to schools as a westerner, he hoped that the schools would also start to think about other options, such as why their government is not helping them with funding for computers. He mentions that he believes that some of those effects have been met, which is important for him. DH describes that it is important for him that the Thai people get a proper education, and that the way they are doing it today does not cut it. He mentions that to sit and read information in the form of papers and writing things with a paper and pen is not acceptable within the 21st century. He describes that this was something that he could help with, but even though he have not spend a lot of money on the project he have invested a lot of time. Even so he believes that it is worth it, as he can help a lot of students with very small means.

DH describes that there are two evident educational gaps in Thailand regarding technology and language. He describes that due to his knowledge regarding education and technology he can do a lot of good. He describes that in some cases he have used some of his own money to upgrade the computers, he for example mentions that he once bought keyboards and mice to the computers. He describes that the important thing for him is to feel that he has done something good.

As the Thai people are beginning to understand that a problem exists, DH believes that they are slowly beginning to understand the educational level have to get better. DH describes that if the educational level in Thailand does not increase, they run the risk of being overrun by richer countries, and that could have negative effects on the country. If this were to happen the Thai people would struggle as their English knowledge and technological knowledge are too low. This is another reason to why he believes that his project is important, and he mentions that the educational level have to increase. This is something that has to be done in the primary school; it is not enough to start doing this at university level. DH ends the interview by saying that he wishes that governmental projects like ‘one tablet per child’ are something that will be realized and that they are not just empty words.

4.1.2 Interview two - Project participant

The second interviewee, DK, is the person responsible for providing storage space for the computers as well as arranging with the handouts.

When asked if he could describe the project, DK says that companies and members from Rotary clubs donated the computers they have handed out so far. He explains that all these computers were old and used ones that the donors had no use for anymore. As the project is dependent on used and disposed computers, DK describes that the computer donations are everything but constant, as they have to rely on companies and people that want to donate computers. He explains that when they get computers from a donor, they refurbish the computers and then tries to hand them out to schools. He also describes that they never charge anything for the computers they give to the schools.
When asked about his involvement in the project, DK describes that when a donor of computers approaches him, he arranges with the transportation of the computer from the donor to his storage room. Even though he arranged with that transport, DK describes that when they have computers to give to a school the handout process could be done in two ways. They either ship the computers in collaboration with another project, or the school has to travel to Bangkok and take the refurbished computers back to their school by themselves. He describes that when they have available computers he informs the schools about it, and tell them to pick them up in Bangkok on their own. As a result, they never ship the computers to the school, unless they have to deliver material for another project to that specific school. DK describes that if they were to travel to and deliver the computers to each school a problem would be that it would have been very expensive.

Regarding how they choose the recipient schools, DK describes that they always go through a local Rotary club. He describes that it would be difficult if they were to look for schools on their own, as there are lots of schools in the country. He also describes that as the country is large, logistics can be a problem, but even so he describes that they have to do it regardless of how difficult the transportation can be. However he does not see transportation as a great problem, as most of the places in Thailand have good roads, so the reason to why they do not transport the computers to the schools is only a cost issue.

DK describes that they never provide the schools with anything but the computers, such as training or free repairs. He describes that the schools have the manpower to train each other on their own; the schools even have to install the computers on their own. After getting the computers, he describes that the schools have to take and send a picture to show that the computers are being used, and then it is fine. DK claims that they have never experienced any real problems with the project, except a broken computer here and there. He describes that this is a minor problem since the schools often are capable enough to fix the computers on their own if they break.

When the schools have gotten the computers, DK describes that someone in the project normally do some kind of follow up, often by calling a local Rotarian to see if the schools are using the computers and if they are working as they should. He describes that they never travel to the schools to do a follow up specifically, but if they are in the area this is something that they can do. If a computer is not working, the schools themselves have to order with transportation back to Bangkok if they want to get it fixed. DK describes that the follow up process is vital. If a follow up is not performed anything could happen. The computers could just be sitting there unused and as such being a waste. As such follow-ups are vital, as anything can happen. He describes that for a lot of other projects he is involved in they have a follow up committee, which is how important he feels it is with follow-ups.

DK describes that some of the schools that they have given computers to had computers from before, but that they only had a few and that those were mostly used for management. However, after the handouts the schools now have around 30 computers that the students can use. He describes that the schools in the past have not been using computers as educational tools, and he is not sure that they are doing that today either. Even though the schools in the rural areas often have computers they only have a few, and cannot provide all their students with computers. These schools’ wish is to have 10 to
15 computers so that the students can use them at the same time. DK describes that schools often call him asking for more computers, but as the project only runs when they have available computers and time to do the repairs he in most cases cannot provide them with that.

DK describes that the computers they have handed out so far, have been running Thai software. The reason to this is that the Thai education system is not good enough. This leads to many people in Thailand having really poor knowledge about the English language. He believes that this has to do with bad policies regarding the education in Thailand. DK also describes that each class often are very large, up to 50 students per class, and he describes that fewer students per class would be a lot better for the education. On top of that he describes that it can be difficult to get good teachers, as the pay for teachers are one of the worst paid professions in Thailand; if you do not pay well, you will not get qualified teachers.

DK describes that he does not want to be involved in the project, and that he only do it as a favour to the person that started the project, and as such he does not really care about the effects that the project can generate. He describes that if he can help and have the time, he often tries to do whatever he can, as he is a Rotarian. DK describes that he now provides storage room for the computers, but that it is all. As he is only helping with the project, he describes that he does not feel anything special for the project. He believes that it is only a small drop in the ocean so he feels that they cannot do that much, even so he describes that he tries to help wherever he can.

In another project that DK is involved in, he describes that they have a funding system, in which they give some money to a local Rotary club. This Rotary club then manages that money and uses them for eventual repairs if the system they provide break. DK describes that he thinks this is very important to do, because one does not know how responsible the schools are. As an example he describes that during another project, a recipient school did not use the system they provided in the intended way, instead they sold water for their own profit. He describes that this can be a problem but that these kinds of problems are very rare, as he has only experienced it once.

DK describes that he thinks that the reason to why the schools in the rural areas does not have computers in the first place, depends on lack of funding. He describes that the government do whatever they want to do, and that is often not to budget for an increase in the computers at the schools. He describes that the schools have budget for the buildings and the teachers, but not for computers. He mentions that a governmental driven project 'one tablet per child' exists, and that the aim of it is to hand out 1 million tablets to grade one students, but he believes it is just a PR trick.
4.2 School A

This section includes three interviews conducted at school A. The school is located in the rural areas of the northern parts of Thailand, and has students from grade 1 to 9. School A has been targeted by two different projects that donated computers, or money for computers, to them, one being a Rotary driven project that donated old refurbished computers and the other being a governmental driven project that supplied a budget for the school to buy computers for.

4.2.1 Interview one - Director

The first interviewee at school A, WD, is the director of the school. His role at the school includes management about the education, human resources, financial and general management. WD has worked as the director of the school for two years, and before that he was a teacher for 22 years.

When talking about how the school uses computers today, WD describes that the school mainly use them in their computer classes. He describes that the students now have computers courses in all grades, and that the school have a special computer subject curriculum for each grade that the government provides. The curriculum specifies what each student should learn in each grade. In addition to having a computers room where they have computer classes, he describes that they have 17 computers in their library that the students can use to search for information to their classes.

WD describes that the main reason to why the school are not using the computers regularly as educational tools is that they lack the budget for it; they cannot afford to have computers in every room, which is why they only have one room at the moment. Even though they regularly do not use the computers in classes except computer classes, he mentions that they do have some CD-ROMs for other subjects that they sometimes use. Even though the school only uses computers as an educational tool to a limited extent, WD describes that he think that they are a good addition to the traditional education.

WD mentions that they at the school have a computer-repairing centre that has enabled them to repair their own computers, as well as computers of other schools if they have had any broken computers. They have a computer engineer at their school due to that reason. He describes that they have this repairing centre because they used to get funding from the government and as such have a budget for it; otherwise it would not have been possible. However, WD describes that the school have difficulties to sustain the computer-repairing centre at moment because the government cut the funding for that part of the school. He describes that they used to get a budget that covered the entire school, but lately the budget have been divided, so now they have a specific budget for the primary and secondary school. This has lead to him not being able to choose where to spend the money on his own, so they have had to stop the computer-repairing centre.

WD describes that most of the teachers at the school know how to use the basic functions of a computer, but that only about 70 percent of the teachers can use computers for their specific role. He describes that it is something that they could become better at. WD explains that the school continuously tries to increase the overall computer knowledge of the teachers at the school, by for example sending all teachers to a training course each
summer, performed by the school’s computer teacher. He also describes that all teachers have to learn and pass an online exam in order to get their teaching certificate, provided by the ministry of education.

WD describes that the computer knowledge of the teachers have improved quite a bit since they got the computers. Before they got the computers about 50 percent of the teachers knew how to use a computer within their area, and now as said earlier about 70 percent of them do. He describes that now a day’s every teacher have to use computers in their work, and because of that, their computer knowledge have improved drastically. The way the teachers use computers in their work is that they use them to create sheets and exams, and also search information for their courses with them. Before the school got the computers the teachers had to write the sheets and exams on a typewriter. He also mentions that most of the teachers own a computer personally, which also has a part to play in the increased knowledge.

WD describes that before they got the computers the teachers had a hard time to prepare for their courses, but now since the school have gotten computers it is easier. The computers have for example made it possible for the teachers to search for information and find pictures. This is something that is appreciated by the students who likes it as it makes it easier for them to understand.

WD mentions that every teacher at the school was very positive towards the fact that they got computers to the school. This was because the school only had six computers before, which meant that about 25 students had to share each computer. Because the school got computers donated to them, most of the students now have the opportunity to use a computer on their own, and this makes it easier for the teachers.

Since they got the computers to the school, WD describes that the students computer knowledge have improved quite a bit. Before they got the computers only some of the students knew how to use a computer, and the reason to that was that all the students had to share a small amount of computers. He describes that it lead to that the students that had the greatest interest in computers only learned how to use them, while other students did not get any access to the computers, something that made it difficult for them to learn. He also describes that most of the students do not have access to a computer at home, which made it even harder for them to learn. He describes that now when they have more computers the students can learn a lot more, since they do not have to share the computers with as many other students as before.

When talking about the general English level among the teachers of the school, WD describes that it is very low. He claims that some of the teachers can read some English and understand some content, but that they cannot speak or understand spoken English that well. He describes that the school have a project for both the students and the teachers with the aim of increasing the English knowledge at the school. He also describes that foreign teachers sometimes come to the school to teach English, which is done as charity. He also mentions that the English level of the teachers have improved a tiny bit since they got the computers, and that they now can search for some information in English and use it for their courses.
Regarding the students English knowledge, WD describes that it is even lower than the teachers’, but that the students in secondary school understand some English. He mentions that when the students use the Internet they mainly seek information in Thai, but that they for example understand the menus of the programs in English. He describes that this problem is caused by the fact that they used to have two English teachers but one of them resigned, so now they have to use a general teacher to teach English. With this in mind he mentions that the lack of English teachers is a problem. He describes that there is a problem with having a general teacher to teach English, but that the problem is somewhat alleviated by the fact that they can use a special cable-TV station. He describes that this station has a teaching hour where they teach English and that the project is based on an idea of the king of Thailand. He describes that the project has been started as a result of the lack of teachers in Thailand.

WD describes that since the school got the computers the students have become a bit better at English, because some of them use for example Google translate to translate English words to Thai, and he would like to think that they learn something from that. However he describes that he does not think that it has improved that much as the basic English level at the school is very low. WD claims that the fact that the students at the school only use the computers for one hour a week certainly is not enough for them to learn English on their own.

When asked if computers are a good compliment to the traditional teaching, WD describes that he thinks that they can help. He explains that he think that computers can make the teaching a lot easier. A key thing for him is that if the students know how to use a computer they can learn more on their own. He describes that now the students do not really have the skills for it, but if they would, it would be easy to implement computers into the regular teaching. He describes that the only way the teachers use computers as a compliment now is with the help of some CD-ROMs, but that they very rarely use them as the teachers do not really know how to use computers as educational tools. WD describes that the school get a large budget to buy teaching material each year, but the problem is that the staffs do not really have the required knowledge to utilize the provided material to its fullest. He claims that this is a top down problem, as the government only provide a budget for the CD-ROMs but no support regarding how to use them or how they can improve the teaching.

WD claims that since the school got the computers, he has seen a difference in how the students work and learn. He explains that students learn quicker now and can do things quicker, as they can use the computers to do e.g. a report on a specific topic and to search for information about it by using the Internet. WD describes that when the school got the computers all the students were really happy about it and positive towards it. He also describes that all students still have a positive attitude towards computers and that many of them use the school's computers in their free time, e.g. to search for information.

WD describes that the largest barrier to implementing computers as teaching tools in Thailand is a budget problem. He explains that the school does not get the right budget from the government. This leads to that the schools have to few computers to support each student, as they now only can use the computers for about one hour per week. He also describes that the overall low English knowledge and somewhat low computer
knowledge can be a problem. Another issue WD brings up is that he is afraid that the students will start using the computers in an inappropriate way, such as visiting bad websites.

WD describes that he would like the school to start using computer-aided teaching, as he believes that it could help the students greatly. However he describes that as of now, he does not feel that the school are ready to introduce it into their teaching system. He does not believe that the teachers’ computer knowledge is the problem, since all teachers can use a computer. He also describes that enough updated teaching content is available in Thai; the lack of available content is not a problem. Instead WD describes that the main problem is the lack of budget.

WD describes that before they got the computers from the Rotary driven project, they only had six computers at the school. He describes that the school tried to get a budget for more computers but they did not get that, so they tried to rent computers instead. However this did not work out, as they in the end did not have enough money to pay for the rent. He describes that the Rotary project gave the school 28 computers, but that only some of them worked, so in total after some repairing they got 18 working computers. In addition to some of them not working he describes that the specifications of the computers were pretty low. This can be a problem he describes, as the school do not have any budget for repairing or upgrading the computers, so when a computer break they cannot use it anymore. WD describes that the school were lucky as they had some computers before they got the computers from the Rotary project. This as their past experience with computers had provided them with some knowledge so they were able to manage the problems themselves.

WD describes that since the Rotary project gave them computers they have also received some funding from the government, so they now have another 30 working computers. A difference from the Rotary driven handout compared to the governmental was the Rotary project just gave the school the computers and then they had to install them and manage everything themselves. The government funded computers on the other hand came with both computer and network installation.

When talking about the government funded project, WD describes that the school got a budget from the government that they had to spend on computers. The government gave the school some specifications, but they had to buy the computers with the provided money. WD describes that the school have not gotten any further support regarding the computers, other than help with instalment. He describes that the government have started to pay for educating the computer teachers at the different schools by sending them to computer training centres. He claims that this is done because the government has begun to send a lot of information electronically.

WD claims that it will be a lot easier for both teachers and students to search for information and to do research if the teachers are provided with more knowledge regarding how computer can be used as educational tools. He describes that this is important because most of the schools in the rural areas have low access to books.
He finishes the interview by describing that the main problem with today’s traditional teaching is a top-down problem. He claims that the curriculum the government provides is not good enough, and has faulty priorities.

4.2.2 Interview two - Computer teacher

The second interviewee at school A, WC, is a computer teacher at the school. Her role at the school is to teach the students about computers, through computer classes, but also to teach the other teachers at the school about how to use computers. WC has worked at the school for five years and teaches all grades.

When asked about how the computers are used at the school today, WC describes that they have computer courses for all grades. She explains that the course differs between the different grades. The youngest students, in grade 1 to 3, only learn the basics like switching the computer on and off, how to use the keyboard and mouse and some general typing practice. In grade 4 to 6 the students learn how to use Microsoft Office (Word, PowerPoint and Excel) and some basics within Adobe Photoshop. She also describes that the students in these grades start to use e-books from the Internet. From grade 7-9 the students start to teach more advanced features in Photoshop as well as some Dreamweaver. WC describes that it is impossible for the school to use the computers as a teaching tool in the regular subjects right now. However she describes that it possible to use material provided by others from the Internet, which is something that the computers have helped with.

WC explains that when she conducts her computer classes, she uses Internet as well as CD-ROMs to teach her students. She describes that the government supplies the CD-ROMs and that they contain learning material. These CD-ROMs are updated once a year, so she describes that the content on them are kept up to date. Even though she use the CD-ROMs in some extent she describes that they are not very useful anymore, since the school now have Internet, which can supply better and more interesting information. WC also describes that most of the content on the CD-ROMs are in the form of a video, which makes it difficult if someone misses a part, as it is impossible to rewind and show that part again. She claims that when using the Internet it is possible and a lot easier to show the same information again, which is why she thinks it is superior. WC describes that the CD-ROMs also contains electronic versions of some books, but that they are not that useful to use due to copyright problems, making it hard to provide many books. She also describes that the material she is using during her classes is provided in the form of papers and CD-ROMs.

WC mentions that the material on the CD-ROMs is generic, i.e. it is the same for every school in Thailand. She explains that the government just provides the CD-ROMs without asking the schools about their needs and that this is done as all schools have the same subjects. WC describes that if the school would have a special wish about the material, they can tell the director of the school about it, so that he can try to get a budget for it from the government. She explains that if the director manages to get the budget, then the school will have to create the material themselves. She also describes that the only computer based material the government provides are the CD-ROMs; they do not provide any material over the Internet.
As WC is a computer teacher at the school, she describes that her computer knowledge and experience is very high. She can use basically every program, and she describes that she often tries to repair and fix the computers on her own if they break. She also mentions that she can fix smaller network related problems. WC explains that she gained most of her computer knowledge at the university when she studied to become a computer teacher, but that she also had been in contact with computers before she started there so she already had some basic computer knowledge.

WC describes that she has noticed a significant difference in how the students and the teachers at the school work after they have gotten computers. Before the Rotary driven project gave the school computers they only had six very old computers that barely worked, so they could not use them for much work. After they had gotten the computers from the Rotary project, and working Internet she describes that all the teachers could start to search for information on the Internet, even though it was slow, to prepare and create better courses than they could before.

WC describes that for her the computers have made a great difference, as she now can show the students what to do, instead of just telling them what to do. It has also become easier for her to teach her students. She explains that some of the students had a hard time to understand the content earlier, but now when the school has more computers it is easier to get them to understand as she can show them and explain better. In general she describes that the computers has helped the teachers a lot as they now for example can get exercises and information from the Internet, which can help them to improve their classes. She describes that a lot of the information that they now have available on the Internet was information that they did not have available in books.

WC also claims that the computers have helped making the student more motivated to learn, as they feel more excited about learning since they can use a computer for it. She describes that the students do not really like to share the computers or to learn by looking at someone else when they use the computer, which they were forced to before the school got the computers from the Rotary project. She describes that the situation is a lot better now that everyone have the possibility to use a computer on their own. She claims that by having more computers so that the students do not have to share computers anymore, it has been made possible to remove some of the books as the students now can use the computers to learn. Another positive effect of the computers is that the students seem to learn faster when they can see photos of what they are learning.

When asked if she thinks that students enjoy learning with computers, WC describes that her general feeling is that all the students like to have the possibility to use a computer and learn on their own, but that it is hard to say as the students only have computer class for one hour a week. She describes that the students in her classes are at different levels and by using computers it is possible for everyone to work at their own pace, and that they enable her to focus on the students that need more support. However WC also describes that she supplies the same material for each student during her class, and that the same is expected of every student at the end of the class, so if someone is working faster she will not supply them with additional material. She describes that she is working on decreasing this gap between students by letting students that finish early help the
slower students. She describes that her feeling is that the students like that approach, especially since most of them seem to like e-learning.

When asked about the English level among the students at the school, WC describes that the students cannot speak or read English at all. She describes that a major problem is that they only have one English teacher at the school, which is not enough to support all students. She claims that it would be easier for her and the other teachers to teach with the help of computers if the English knowledge would have been higher. WC describes that her wish is that the school had a room with headphones and computers, so that the students could use the computers to practice and learn English themselves. If the students would have had better English knowledge she feel that she would not have to help them as much, as she today have to help them to translate words from English so that they can find the information about it.

WC describes that, as mentioned earlier, when the school got the computers the students were really happy. She explains that the students were not only happy about getting computers, but also happy about that they could start to use computers in class. She claims that since the school got the computers, she has not seen a single student in a computer class who looked sad or did not want to learn. She describes that most of the students are poor, and that their only chance to learn about and use a computer is in school. She describes that this further stresses the importance of having computers at the school.

In the future, WC describes that she wish that they could have their own e-learning at the school. She also describes that she would like a way for the teachers at the school to get access to material from other schools and teachers, and mix it to create better learning material. She explains that this solution could be useful if or when teachers at the school have material for their classes that are not good enough. WC describes that this is the plan for the school in the future, but that there also have to be some kind of approval process of the available material. WC describes that she really thinks that it would be a good idea if the teachers could share their material and that one idea is to have a website where teachers can share their material with each other.

When asked about benefits associated with using computers as an educational tool, WC describes that the main thing is that it is easy to attract the attention of the students. WC claims that if a teacher teaches in the same way all the time, the students will get bored. By using a computer to teach the students they will get excited and pay a lot of attention to what is being said, especially since the teachers can use pictures and sound. She describes that she does not see many problems with introducing computers into the teaching. The only thing she can think of is that the students might spend too much time in front of the computers and that they will visit inappropriate websites.

When asked about the school’s Internet connection, WC describes that they have a 2 Mbit/s connection in the computer classroom and that is enough for everything they want to do. She claims that they do not have any problems related to Internet at the school, and that rarely have any problems with stability, only when the weather is really bad.
WC describes that before they got decent Internet and only had a small amount of computers at the school, she had to show the students the content on one monitor. This lead to that she had to walk around and tell the students that did not understand, one by one, something that was a very time-consuming process. She explains that since the school has gotten more computers, and better Internet connection, a lot have improved and the students can now see the information clearer and understand it faster. WC claims that this mainly has to do with the fact that she today can use a projector and that each student have access to a computer during the class.

When asked about the standard of the computers that the school got from the Rotary project, WC describes that the computers fulfilled every need the school had even though they had low specifications. She claims that the computers still were useful because they changed a lot for the school, since the students all of a sudden had one computer each when they had computer classes, which was huge for them. The computers also enabled the school to provide more computer hours for each student, and even though the Internet connection was slow at that time, the students could still surf the Internet and learned a lot from that. To sum it up, she describes that the school could use the computers for everything they wanted, and she mentions that the computers still are used for teaching the other teachers how to become better at using computers.

Regarding her current opinion about the computers the school got from Rotary, WC describes that even though they have low specifications and old version of Windows and programs they are still very useful, but mainly for the students in the lower grades. WC describes that she experienced some problems when trying to install software on the computers from the Rotary project, but that in most cases the problem was solved by installing an older version of the software instead. She describes that that the new computers that the school have bought with the funding from the government are easier to use because they are running newer versions of Windows and programs. She describes that the newer versions have easier patterns that she and the students can follow. She also describes that the new computers with higher specifications have made her work easier and more convenient due to better technology. Even though she thinks the newer computers are better, she mentions that it is important that students get to know different versions, as that might be what they have to use outside of the school. WC explains that the old computers are mainly used to search the Internet now a day, and they have been moved to the library; the computers are not used in the computer lessons any more.

When asked about her experiences from the Rotary project handout, WC describes that she did experience some problems. She explains that many of the computers did not have working CD-ROM units, or even lacked it, so she had to try and fix external CD-ROM units on her own. In addition to that she also describes that some of the computers had corrupt versions of Windows, which made them unusable. Besides from that some computers did not work correctly, the school did not have any problem with only getting computers. However she describes that it can be a problem to receive computers with flaws, as schools can have a hard time to get a budget for repairing and fixing them. WC describes that she would have wished that the computer they got from the Rotary project worked better and had a bit higher standard when they got them. However she describes that it was not a problem since they were happy to get computers and the computers were
still very useful. She describes that she wish that they would have gotten more computers, as they really wish to have computers in each classroom.

WC describes that another thing she would have wished for when they got the computers, was to get some support when computers breaks. She describes that an option could be that someone could come and have a look at the computers and repair them. She explains that another option is that the school could send broken computers somewhere to get them repaired and then sent back to them; some additional service would be good.

WC describes that when the school got the computers from the government, they received a budget for buying computers on their own. With that money they then bought computers from a company that provided service for getting all the computers installed. She also describes that the computers had a 3 year warranty, something that was good since they did not have the budget to repair the computers.

### 4.2.3 Interview three - Regular teacher

The third interviewee at school A, WG, is a general teacher in grade three. She teaches the student subjects like Thai, science and mathematics. An important part of her job as a teacher is to look out for the students and take care of them. WG has been working as a teacher for 20 years, of which 15 years at the school.

When asked about how the computers are used at the school, WG describes that they mostly are used to prepare courses, making sheets, exams and exercises and for playing CD-ROMs for students. She explains that the computers are also used in administration; the school can communicate with and send information to the head office electronically via an e-office. She describes that the school plans to have computers in each classroom in the future, but that the school does not have enough resources for that at the moment.

WG describes that she uses computer in her daily work, but that she only uses them in teaching about once a week. She explains that when using computers in teaching, she never use computer-based material as the main material; instead she always uses her own material as the main material and just complement it with some computer-based material if she finds it useful. WG describes that computers are helpful in teaching but that it is impossible for her to use them in all her subjects. Mathematics and Thai are two of the subjects where she claims that she cannot use computers because they require a two-way communication between her and the students. She explains that when teaching Thai, it is important to be able to explain to the students, listen to what they say and check what they write. She claims that it is impossible for computers to manage that kind of work.

WG describes that before they got computers donated to the school, she could only use their old computers for writing and for making sheets. She explains that she has gotten more used to computers now and can use them better now than before, but that her computer knowledge is still lacking in some regards. WG explains that she can use computers today to perform basic things like using Microsoft Office and search for information on Google. She describes that she is more into technology now than before; she can search the Internet, has Facebook, e-mail etc. When comparing her computer knowledge with the other teachers at the schools, she describes it as quite similar to the general level among the other teachers.
When it comes to students’ computer knowledge before the school got computers, WG describes it as very limited. She explains that this has to do with the fact that many of the students’ parents being quite poor, which makes it hard for them to afford to buy computers. She claims that she has seen a change in the general computer knowledge among students after they got the computers. She describes that the students know more about computers now compared to before and that they can use them much better. WG also describes that she has noticed a difference regarding how students learn now compared to before the school got computers. She claims that students learn much quicker and are smarter now, and that they really like to use and learn with computers. She describes that many students tend to get bored when they only learn the traditional way, i.e. with books. WG also describes that many of the students lack the required computer knowledge to be able to use computers in classes. However she does not see any problems with this because the students are quick learners and there are just some additional things that they will have to learn.

WG describes that the computers have changed the way she perform her classes, because now she has started to use the computers in her teaching. She describes it as a wakeup call for her and the other teacher when the school got computers and started to use them. When the school got the computers she became very interested in learning more about how to use them and wanted to start using them in class. She describes that the computers have made her job both more convenient and better as it is easier to collect material for her classes now compared to before they had computers at the school. She also describes that she has a lot more information that she can chose from now because she can access the Internet, something that have made her job easier because the local database at the school is quite small. WG explains that before the school had computers, she had to go to the library to find relevant information, which was time consuming and the available information was limited.

When asked how she uses computer in her teaching today, WG describes that she only uses them to show information to her students. She explains that it is only her and never the students that use computers in her class and that the information she shows is mainly websites with information related to the current subject. WG describes that she occasionally also uses video material, provided by the government, in her classes. She claims that these videos are helpful tools because many students remember easier when they can learn by watching videos.

When discussing her English knowledge, WG describes that it is quite low and that it is difficult for her to understand English. She explains that if she finds a website with English content, she just skips it. However she do not see this as a problem since she always uses Thai keywords when searching for information, which result in the search hits mainly being in Thai. She claims that there is a lot material available in Thai, and that she therefore does not see any problems with only using Thai keywords when searching for information.

When it comes to how she gets her learning material for her classes, WG mentions that she gets most of it from the Internet or from CD-ROMs. When collecting learning material from Internet, she always uses a search engine combined with different keywords. She explains that she usually start by visiting the first hit and read the content
on that website, she then visit the second hit and read the content on that website. If the information on the two pages matches, then she considers the information reliable and appropriate as learning material. She does not think that this process is time consuming and she does not know if there is another easier way to collect learning material via Internet. When asked if the teachers share any learning material, WG describes that the teachers who teaches at the same grade often share learning material with each other. She explains that this sharing of learning material is only within the school; no teacher at the school shares any learning material with teachers from other schools.

WG describes that some, but not all, of the teachers have the required knowledge to introduce computer-aided teaching at the school. However she does not see any problems with introducing computers in education because the teachers at the school are quick learners and would learn how to use computers in education quite easy. She describes that the computer teacher has studied and learned about using computers as teaching tools, and that she has shared some of her knowledge with other teachers. She claims that these teachers who know how to use computers as a teaching tool easily could teach the other teachers.

WG describes that it is quite tough to be a teacher because she has to check that all students have understood things right and that they are working as they should. To manage this, she has to walk around in class and check with every single student. She describes that her job would have been easier if the classes were smaller. Even so, she does not feel that the classes at the school, consisting of 25-35 students, are too large.

When asked about her opinion about computers in teaching, WG describes that she thinks that they are good tools that can ease the teaching. She mentions that the largest benefits with computers in teaching are that they make it possible to play CD-ROMs with learning material and to search for information. She claims that if the school were to introduce computer-aided teaching, it would make her job both easier and quicker. She also thinks that it would make learning easier for students. The only problems she can see with introducing computer-aided teaching is that students might use the computers in inappropriate ways and search for things that the teacher does not know about.

WG feels that the computers that the school got from the Rotary project were useful when they got them, even if some computers did not work correctly from the beginning. She describes that it was impossible to save anything on some computers due to lack of hard drive space. Another problem was that some computers were slow and that some computers broke due to the extensive use, i.e. too many students used them. Some computers also required repairing, which was difficult because the school did not have the budget for that. WG describes that it would have been good if the computers they got had higher specification, but that the school was happy to get computers at all. She describes that even if she prefers newer computers with high specifications the most important thing is that the computers works properly and is fast enough. She describes that even if the 30 computers that the school got from the Rotary project were useful, the amount were not enough to support all students at the school.
WG describes that she and most of the other teachers had enough computer knowledge when the school got the computers from the Rotary project. She also claims that all teachers, even the old ones, liked the idea of starting to use computers and wanted to know more about them. She describes that she had enough computer knowledge because she was interested in computers and started to use computers early. She claims that it instead would have been useful if the donors had provided an instructor that taught her and the other teachers about how to teach the students about computers.

4.3 School B

School B is a school in the rural areas in the northern parts of Thailand. The school is an elementary school that teaches students from kindergarten to grade 9. School B has not received any computers from the Rotary driven project, but has received money for computers from the government. The school got its first computers in 1996. School B has also been chosen as one of the two ICT-schools of the area by the government.

4.3.1 Interview one - Director

The first interviewee at school B, CD, is the director of the school and has to look after everything from grade 1 to 9. He has been working as the director of the school for 14 years.

CD describes that the school got its first computers from the government 16 years ago. He explains that they got less than 10 computers and that he thinks that it was too few. After that the school has also tried to rent computers with the help of students’ parents. CD also describes that the school has been chosen to be the one of the two ICT-schools of the area, and that they therefore get a larger ICT-budget than many of the other schools in the area. He claims that this has led to the school putting a lot of attention on ICT and wants to show good results to others. One of the things that the larger ICT-budget has led to is that the school has been able to build a special computer building where they can conduct their computer classes. CD describes that even though the school has a larger ICT-budget than many of the other schools in the area, he still have to try to get a budget himself as the government does not provide the school with a budget large enough to fill all of the school’s ICT related needs.

When asked about how the school uses the computers today, CD describes that the school are using them in their education. He explains that the computers are used to teach students how to use computers but also as a normal teaching tool in the regular subjects. He describes that when teachers use the computers as a teaching-tool, the material is mainly taken from CD-ROMs.

Regarding how the computers are used in the education, CD says that it differs between grades. He explains that in kindergarten the students get to learn some basics like how to turn the computer on and off, how to play some games and how to use the Internet. In grade 1 the students learn how to type and how to use programs like Microsoft Word; they are taught how to use computers in the everyday life. CD describes that from grade 2 to 6 the students mainly use the computers for computer-aid teaching and that they can use the computers by themselves and can for example use CD-ROMs provided by the teachers and watch the content on their own. He explains that in grade 7 to 9 the students
get to learn more advanced things like programming and software like Adobe Photoshop. In grade 1 to 9 the computers are used in most subjects for computer-aided teaching and in the computer subject.

When it comes to the general computer knowledge among the teachers at the school, CD claims that all teachers know how to use computers and that about 60 percent of them have good computer knowledge. He describes that it is mainly new teachers that have good computer knowledge even if most of the older teachers try to learn how to use them and wants to know more. CD claims that he has noticed that the general computer knowledge have increased since the school got computers, both among the younger and the older teachers. He thinks that one reason for this is that all teachers have to use computers in their daily work so they are basically forced to learn and improve themselves. He describes that the fact that the school has a policy that all teachers must have access to a computer at home has most certainly helped to.

CD describes that the school also tries to increase the computer knowledge among the teachers by giving them additional computer training. He explains that this training is funded by the government and takes place every summer break when the school is closed. All teachers are then sent to a university who provide them with computer courses. He describes that in addition to these computers courses, the teachers are also provided with online training and some training on CD-ROM, which they can use to learn by themselves. CD explains that all computer training is financed by the school, unless some teachers want to learn something specific, then they have finance it themselves.

When asked about the general computer knowledge among the students, CD describes that it varies between different grades because the students learn gradually. However he describes the general computer knowledge as good. He explains that before the school got the computers, many students did not have the required computer knowledge but wanted to learn. CD claims that the lack of computer knowledge mainly had to do with the fact that most students did not have access to computers at home. CD describes that after the school got computers, the computer knowledge among students have increased and that most of the students have gained most of their computer knowledge from school.

When discussing the English level at the school, CD describes that it is quite low among both students and teachers. He explains that the teachers at the school can understand some English but not much. CD describes that if teachers have trouble understanding content in English online, they often use a translation tool that interprets the content to Thai. CD claims that the general English levels among students are even lower, and that they for example tend to be able to use English menus on the computers because they get used to them rather than understand the meaning of them. CD explains that all the learning material they use at the school, as a result of the low English level among both teachers and students, is in Thai.

CD describes that he thinks that computers are good teaching tools and that they are very useful as a complement to the traditional teaching. He claims that by using computers as teaching tools, it is possible for both students and teachers to get more information, and thereby also knowledge.
CD describes that he feels that the school does not have enough teachers to support all students. He claims that the school needs more teachers with specific knowledge within specific fields. He describes that it would be helpful to have more computers, but that they would not solve the problem of lack of teachers, as the school would still need more teachers within specific fields. CD describes that he hope that every student can have their own computer and software for all subjects in the future. This as it would enable the students to learn on their own. He describes that now when teachers teach in many subjects, it is impossible for them to know everything within every field and that computers therefore could be useful.

When discussing barriers for implementing computers into the education in Thailand, CD describes that he cannot identify any problems at the schools. He claims that all teachers have the required knowledge and the students want to learn. Instead CD claims that the management, from top to bottom, is the main problem. He describes that if only the government provided skilful people and a budget to repair the computers, the situation at the school would be a lot better. CD describes this as a national problem that has to do with budgets and that the problem is that some politicians focus on other areas rather than on education because they want to make money. He also claims that this problem have to do with the culture; even if the government provide a large budget for education, 70 percent of the budget goes to salaries and buildings and not much are spent on trying to develop the educational system. CD explains that it is not enough, and that the government also should help with the taxes, because computers are so expensive, i.e. the school cannot afford to buy them. CD describes that a risk he sees with introducing computer-aided teaching at the school is that the students will start using the computers in the wrong way, e.g. visit inappropriate websites. He therefore thinks it is important that the teachers at the school first learns student about right and wrong, i.e. what they can and cannot do on the computers.

When asked if it is hard to find teachers with computer knowledge, CD describes that it was hard in the past because the government did not educate people to become computer teachers. He explains that it is easier today because the government have started to educate specific computer teachers. He describes that it also has become easier to find teachers with computer knowledge within other subjects because all teachers that the government educates have to learn some basic computer knowledge. CD describes that all the school have to do to get a qualified teacher with computer knowledge today is to inform the government that they are in need of a new teachers within a specific area.

When discussing the Internet connection at the school, CD describes that all computer at the school have access to Internet, provided by the government. He describes that in the past the school had some problems with the Internet connection, as it was very slow. He explains that the Internet connection is much better today but that they still experience some problems since the Internet speed differs over the day and that it can be a bit slow when many people are using it. CD hopes that this problem will be fixed in the near future when the school will get their new Internet connection provided via fibre optics.

CD explains that that when the school got their first computers 16 years ago they did not really know how to use the computers in the beginning. He explains that a problem was that the computers came with Windows 3.1 which was pretty difficult to learn. He
describes that in order to get the teachers to learn, the school had to send the teachers on courses first. He explains that the teachers were sent to training as soon as the school found out that they were going to get computers. CD describes that this was important because by the time the computers came to the school, it did not take that long time before the computers could be utilized.

When asked if the school could have needed some further assistance after they got the computers, CD describes that some kind of assistance definitely would have been helpful. He explains that the school first of all need a budget for repairing, as they at moment lack the possibility to repair the computers if they break. Secondly he describes that the school would need some kind of human development assistance, so that the teachers can be educated about computers and how to maintain them. CD claims that if the teachers could prevent computers from breaking or repair them if they do, then it would be a lot better for the school, and not as expensive. CD describes that the greatest problem is that the school’s repairing-budget is way too small. He explains that before the school used to get a yearly repairing-budget of THB 800 (~SEK 1752 / ~GBP 733), for all computers at the school. CD explains that this was way too little money and that it was impossible to do anything with them.

4.3.2 Interview two - Computer teacher

The second interviewee at school B, CC, is working as a computer teacher at the school. She has been working at the school for 16 years and in her work as a computer teacher she teaches all grades at the school; from kindergarten to grade 9. CC describes herself as the pioneer regarding computers at the school.

When asked about her computer knowledge, CC describes that her experiences with computers started 16 years ago when they got their first computers at the school. She explains that because she was the youngest teacher at the school, the director decided to send her on computer training. Besides that she also took some other courses on her own and bought many computer books. She mentions that she uses computers a lot in her work today and that she for example has to send forms over the Internet to the government. She describes that she still learns new things and is constantly improving her computer knowledge.

Regarding how computers are used by the teachers at the school, CC says that they use them on a daily basis. She describes that the other teachers uses the computers to prepare their courses, when they for example need to get further information. She explains that the other teachers also uses the Internet to find exercises that students can finish and for checking for educational news. She describes that some teachers uses the computers together with small speakers for playing CD-ROMs, but that it is not as common as it was before.

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2 http://www.forex.se/ [2012-04-30]
3 http://www.forex.se/ [2012-04-30]
CC describes that the learning material that she and the other teachers use today are provided on both CD-ROM and through the Internet. She explains that the Internet content they use is updated by a governmental apartment constantly for free. The content provided on CD-ROM on the other hand is not updated. CC describes that the school instead get the first version of each CD-ROM for free, but if they want to get an updated version, then they have to pay for it themselves.

When asked about how she teaches her student, CC describes that discipline is very important and that she always emphasizes on it when teaching. She describes that before each class, all students have to walk to the computer room in a straight line, and then turn on the computer correctly. She also teaches her students which websites that is inappropriate. She explains that if students visit one of these websites anyway, she punish them by forbidding them to use the computers for two days. CC describes that all students are allowed to learn in their own pace in her classes. She describes that if some students are quick learners she lets them sit in a small group. She claims that even if some of the students are slower learners than other, all students still wants to learn and likes the idea of using computers.

When asked how she conducts her classes, CC describes that she always starts each class with a review of what the students learn last time. After that she teaches the students something new and then hands out assignments that the students can use to practice. She explains that if students finish early, she awards them by allowing them to play a game. She describes that what students learn in her classes differs between grades. In kindergarten the students learn how to turn the computer on and off and get to play some games. In grade 1 to 2, the students learn how to use Microsoft Word and in grade 3 to 5 they learn Microsoft PowerPoint and Excel. In secondary school, i.e. grade 6 to 9 the students get to learn Adobe Photoshop, Adobe Flash and some programming. CC explains that the material she uses in her classes are mainly books, checkups that students can use to learn step by step and paper sheets that students can follow and practice with.

CC describes that computers are helping a lot because the students really like to use them in teaching. She claims that students like computers because they can see what to do easily and understand the context better, which also enables students to learn quicker. She means that it is more efficient to use computers in education than to teach in a more traditionally way in front of a whiteboard and that the only reason to why the school does not use computers in the regular education today is because of its limited budget. She describes that if only the school got further financial support, which enabled them to introduce computer-aided teaching, it would not be a problem to do so, as all teachers and students have positive attitude towards using computers.

When asked about her opinion regarding the computers they have at the school today, CC describes that the computers fulfil all their current needs. She describes that the only problem she sees is that the school got too few computers. She explains that she would like to have two computer rooms instead of only one, so that the students could get more computer hours per week. She also thinks that another computer room would be good because then it would be possible for the other teachers to use the computer room for classes in their subjects as well.
When it comes to the amount of computer teachers at the school, CC describes that there are no direct shortage, but that one or two more would be good because she has many teaching hours per week. She explains that the reason to why the school only has one computer teacher has to do with the school’s limited budget. She also claims that there is a problem with the allocation of teachers from the government; when the government hires new teachers they only look at the amount of students at each school. This makes it difficult for the school because the larger school gets priority.

CC describes that because the school is located in the rural areas, students had little knowledge about computers before they got computers to the school. She explains that at that time the students spent most of their spare time playing outside, but that this has changed since they got the computers. She explains that now students spend a lot more time in front of the computer instead of going outside and that students were healthier before because of this. CC describes that one positive thing with the computers is that students feel more excited to learn now because of the new technology. She also claims that they now feel more equal with the students in the city because they can access computers and the Internet. Another good thing that CC describes is that students can get more information worldwide, which was hard before. She also explains that the computers have made it possible for the teachers to improve their learning materials by using computers and the Internet.

When talking about barriers for implementing computer-aided teaching, CC describes that one problem is that the school does not have the budget to repair the computers. She explains that it would become a burden for the school to introduce computer-aided teaching at the moment, since it would be difficult for them to repair and maintain all the required computers. Another problem that CC describes is that some of the computers they have today are not fast enough so they would have to upgrade them, something that they cannot afford either. She also describes that they have a space problem at the school; the school have no space to put the new computers. Besides that she do not see any further problems with introducing computer-aided teaching because all students and teacher have a positive attitude towards it. She also feels that there is enough available learning material to support computer-aided teaching at the school and that the available material is up to date.

CC explains that when the school got their first computers 16 years ago it was difficult for her to get the other teachers to understand the advantages with computers. She claims that this mainly had to do with the fact that most of the other teachers were quite old and had no interest in learning computers. CC describes that another possible explanation to why it was difficult to get the other teachers to understand the advantages with computers could have been that the computers were much more difficult to use compared to today. She describes that it for example was impossible to change the computer language to Thai back then which was a great issue. She claims that today the situation is totally different; all teachers at the school like computers and no of them are e.g. afraid that computers will take their jobs. She claims that all teachers have a positive attitude towards computers and find them useful. CC explains that one reason to this changed mindset can be that the computers they use today are much easier to use.
4.3.3 Interview three - regular teacher

The third interviewee at school B, CG, is a science teacher for grade 7 to 9. He has been working as a teacher for 10 years, but only one year at the current school.

When asked about how often he uses computers, CG describes that he uses them every day in his work, and that he mainly use them to prepare his classes. He explains that he collect most of his learning material for his classes from the Internet. He describes that most of the available content on the Internet is quite good because it is related to the content in the books they use at the school. In this way the Internet makes it easy for him to add something that he cannot find in the books. CC describes that the only source when collecting material from the Internet for his classes is Google. He claims that it is not a very time consuming process to search for learning material using Google, as it normally takes less than 30 minutes.

When it comes to his computer knowledge, CG describes it as quite good. He explains that he can use the computer to do basic things like using Microsoft Word, Microsoft Excel and the Internet. CG describes that he has gained most of his knowledge from when he studied at the university. He explains that the school provides all teachers with computer training but that he has not yet received any because he has only worked at the school for one year. CG claims that it is important that he and the other teachers are provided with further computer related support in the future because of the rapid development within the area.

Regarding how he conducts his classes, CG describes that he starts every class with an introduction to describe what the students are going to learn during that lesson. After that the students get time to learn and an opportunity to ask questions and share ideas with him and the other students. He explains that he usually uses things from reality in his education but that he also shows pictures and videos for the students as a complement. CG describes his way of teaching as quite traditional as he often uses the whiteboard to write down the content and gives sheets of papers to the students. He explains that because of the lack of computers, all learning material that he hands out during his classes is on paper. CG describes that the only time he uses computers in his teaching is when he wants to show something special on a CD-ROM, but that this happens quite rarely, about once a month.

CG describes that he does not think that the school has too few computers today but that it would be good if they had more computers. He claims that all the computers they have today have enough standard to fulfil all his current needs.

When talking about learning material, CG describes that it is almost impossible for him to share his learning material with other teachers. He claims that the only way he can share his learning material with other teachers is if he meet up with another teacher and discuss it. For this reason, most of the learning material he uses today in his classes is created by him and is not shared with other teachers. He explains that a database were he and other teachers could share learning material would be very useful.
When asked about his opinion regarding computers, CG explain that he thinks that computers are good tools for supporting teaching because they can ease the workload of the teachers. CG also describes that he thinks that the computers can make it easier for students. This as the computers for example makes it possible to create summaries of books, which the students can read instead of reading whole books. CG describes that computers also are useful when he want to create exercises, because they allow him to just create the exercise and then print it out, instead of writing it down on the whiteboard, which will take a long time. CG also claims that computers would make the classes more interesting for students.

When discussing problems with today’s education, CG describes that the greatest problem has not to do with the sizes of the classes but rather that the students within each class are very different. He explains that because some students are quick learners and some are slow it is hard for him to help everyone in the class since he has to focus on the slower learners. He believes that computers would help in this regard because they would decrease his workload and make him less tired.

Regarding the computer knowledge among the teachers, CG describes that the general computer knowledge are good and that all teachers have basic computer knowledge, e.g. all teachers know how to put in a CD-ROM and show the content for the students. CG explains that most of the teachers at the school have enough computer knowledge to start using computers in the education, but that some teachers might need some extra support. He claims that the problems, i.e. the lack of knowledge among some teachers, are related to specific programs. He explains that some teachers have trouble doing more advanced things like using Microsoft PowerPoint to create learning material for their classes. When it comes to students’ computer knowledge, CG is confident that it is high enough, and that all students would manage to start using computers in the education without any problems.

When asked about barriers for implementing computer-aided teaching at the school, CG describes that the greatest problem is the lack of computers. He claims that if the school only had the required computers it would not be a problem. The only other problems that he can think of is that some students might use the computers in the wrong way and that they might become obsessed with computers and start to spend more time in front of the computer instead of playing outside.
5 Summary of case results

In this chapter the result from a comparative analysis per case with each respondent is summarized, analyzed and presented. The summary of the results are presented for each case as well as for the two interviewed donors. Each section ends with a concluding bullet list where the most important findings are presented.

5.1 Donors

After analyzing the gathered data from the donors, it is evident that a governmental issue exists in Thailand regarding how they prioritize the school budgets. Both DK and DH describe that the Thai government have bad policies regarding today’s education. The focus of the government, both today and earlier has been on giving the schools a budget for buildings and their teachers, and not as much focus on improving their courses and the connected material, i.e. the educational system at the schools. DK describes that teachers are one of the worst paid occupations within the country, which makes it difficult for the schools to get qualified teachers, and this is another reason to that the government has a part to play in the bad educational system. Without qualified teachers it is impossible to increase the educational level in the country. DH also describes that the government have a part to play in the poor technical infrastructure that exists in Thailand, which also points towards that a top-down problem exists in Thailand. With this in mind it is obvious that computers would be a good complement to the traditional educational system of Thailand. DH emphasises that it is important that computers are introduced in the schools at an early level i.e. elementary school.

Another issue described by both DK and DH is the generally low English knowledge that exists at the schools in Thailand, especially evident in the rural areas. With that in mind, it is evident that it is not enough to only supply the schools with technology and general software; one cannot apply the expression ‘one-size-fits-all’. It is important to understand that just because software has been implemented successfully in several countries, there is no guarantee for its success in every country, because as described above, barriers related to for example language could exist. This is another evidence that points towards an existing top-down problem.

Both DK and DH describe that they never transport any computers to the schools specifically; this is something that is done only when they have other business within the same area. This is an indication that it is expensive with logistics in Thailand, and as such it would have been too expensive to transport the computers to the specific schools. DK is affiliated with a logistic company in Thailand and he mentions that the country is large, which is a problem when it comes to logistics. With this in mind, it is important to solve the issue regarding transportation in advance; otherwise the donor runs the risk of not being able to get the computers out. As it is expensive to transport the computers, both DK and DH mention that they try to work with other projects and solve the transportation issue in collaboration with those projects, i.e. it is important to find alternative solutions. It is also evident that both DK and DH feel that the solution they have today where the schools pick up the computers by themselves is working, even though the schools are poor.
DK describes that transportation is no problem because Thailand have good roads. DH on the other hand describes that one large problem in Thailand is the poor technical infrastructure. This indicates that Thailand have invested in building a working traditional infrastructure but has not really made the required investments in the nowadays so important, technical infrastructure. That a poor technical infrastructure exists is further strengthened by the fact that DH mentions that the technological level at many of the schools in the rural areas are very low.

When analyzing the collected material, it is also evident that there is a difficulty in regards of finding trustworthy and ‘worthy recipients’. Both DK and DH describe that it is important to do thorough research about the recipients before they are targeted. If this is not done properly, one runs the risk of failing with the project. Just because something feels right, does not mean that it will work out. DK and DH mentions that some schools might not be serious about a project, which can lead to that the computers ends up with the wrong people, or that the donated computers are not utilized to its fullest. As there are many schools in the country, it can be difficult to find suitable recipients, and as such it is important to have some kind of human infrastructure in place to make this work easier. Just as important as it is to find worthy recipients it is to collect information about what the schools intend to use the computers for. DH also describes that it is important to get information about the situation at the school, for example space for computers and electricity. DH mentions a project conducted by the Thai government that failed, because they delivered computers to a school without electricity. With this in mind it becomes evident that it is important to get an understanding not only about who the recipient is but also about the conditions at the schools. DK mentions that one way to make sure that the recipients are serious, is to force them to do something in return of getting equipment donated to them.

It is also evident that it is just as important to do follow-ups after a project have been conducted as it is to do a thorough research about the recipients. By doing follow-ups it is easier to make sure that the donated material is being used, and that it is used in the way it was meant to be used. DK describes that if a follow-up to a project is not done, there is a risk that the computers could just sit at the school and not being used at all, and as such the project would have been a failure – “anything can happen” (DK 2012-04-19). DH mentions that it is difficult to make sure that the donated computers are being used the right way – “one cannot take for granted that what you are doing is working just because it feels right” (DH 2012-04-26). With this in mind it is evident that it is not as easy as just donating something to a school and then expects that everything is fine.

It is evident that an issue regarding how to support the schools after they have been given the computers exists. Both DK and DH mentions that they today do not provide any further support besides giving the computer to the schools, but DH describes that he would like to do so in the future. During the interview, DK says that “one does not know how responsible the schools are” (DK 2012-04-19). This indicates that it is difficult to provide further support to the schools, and that there is a risk with only supplying the schools with money for maintenance, as you do not know what they will use them for. DH describes that the project is not that expensive to carry through, but that it is very time consuming. With this in mind it is evident that an alternative funding system is
required if further support are to be given, as it would be close to impossible to provide that support on your own to all schools, mainly due to time limitations.

It is obvious that the project is very primitive and everything but constant today. The main reason behind that is that the project is dependant on donated computers; that companies replace their old computers and choose to donate them to the project. Even though it can be difficult to get computers for the project, they still manage to get a few from time to time. However, as DH describes, it is not viable to only send computers without any software on them – “…the computers should run at least Windows XP and Office 2003” (DH 2012-04-26). This pose a problem, as it is expensive to buy licences for all the computers, so DH have so far played on the poor copyright laws in Thailand. With this in mind it is evident that both computers and software have to be donated at the same time so that the schools can use the computers. A solution to the problem with expensive software licenses has to be found. A solution could be to arrange with sponsorships, as DH mentions for example Microsoft could sponsor them with software.

When interviewing DH it became evident that a change of focus within the project is needed, from just donating computers, to supplying additional services like ‘train the trainer programs’, additional software for teaching as well as further assistance with repairing and upgrading the computers. As a first solution to the problem with not having enough computers at the schools in the rural areas, it can be OK to only provide the computers. But this is not sustainable in the long run, as the needs of the schools changes over time.

It is evident that there are cultural difficulties associated with conducting projects in developing countries. DH describes that he in his daily work comes in contact with customers that refuse to upgrade their old software. Instead they prefer to use software that they are familiar with, and that they know works. This can create difficulties when trying to ship out computers or software to rural areas, as similar fear of change can exist in those parts to. This fear can be based on the lack of knowledge of what the technology can do for the user. DH describes that “…by reasoning like that the Thai people will not utilize the new technology to the fullest” (DH 2012-04-26). This makes it evident that a cultural problem exists, and that a change regarding how the Thai people view new technology is required.

It is possible to identify a difference between how people from developed countries and developing countries reason when they choose to participate in a project to help others. When interviewing DH, he describes that the reason for him performing this project is because he wants to give something back to the Thai people and help them to get a better life. His way of reasoning is in line with the concept of CSR, which means to help and give something back to society. When interviewing DK, a Thai, it became evident that his intention to participate in the project was entirely different from DH’s. He describes that he only participated because he could and did not really care about the project or if it delivered any positive effects. This clearly indicates that people from different countries reasons differently when choosing to participate in this kind of projects.

Both DK and DH describe that they believe that schools can make great changes with small means. DH says: “20-30 computers can support up to about 20 times the amount of
students” (DH 2012-04-26). With this in mind, it is evident that the people behind the project believe that the schools can accomplish a lot on their own, and with small means. The fact that they do not provide any additional support also points towards that they believe that the schools have the capacity to solve problems on their own. This is even more so evident when thinking about that both DK and DH describe that they do not see any problems with donating old and used computers to the schools, especially as old computer might require some extra effort for the recipients. However, DH describes that the donation of old computers can pose a problem to the donors. It can be difficult and time consuming to repair and upgrade the computers, and even difficult to find compatible components.

With the low general English knowledge that exists at most of the rural schools in Thailand, it is evident that a need to customize the delivered software language to fit the schools is an important aspect to consider. DH says: “I wish that we could customize solutions to each school, depending on their current situation” (DH 2012-04-26). This is an important aspect to take into consideration if the recipients are to fully utilize the donated technology.

It is evident that even though the donated computers have been old, the schools have been satisfied with them. DK describes that schools often contact him and asks if it is possible to get more computers. This is further strengthened by the fact that DH describes that he has only heard positive feedback regarding the project so far. This indicates that even though the computers do not have the highest specifications they are still useful at the recipient schools. This is also an indication that there is a shortage and lack of computers at the schools in Thailand. DK describes that computers has not been used as educational tools in the past, and he is not sure about if they are used today either. For schools to use a pen and paper in their regular schoolwork in the 21st century is unacceptable according to DH.

Concluding remarks:

- Governmental issue
  - Poor educational policies
  - Budget problems
- Low English level at the schools
- High logistical costs
- Poor technical infrastructure
- Important to find worthy recipients
  - Get information about the situation at the schools
  - Information about how the school intend to use the computer
- Important to do follow-ups
- Further support is needed
  - Alternative funding system
- Not viable to only send computers without software
  - Expensive software licenses
- Additional service needed
  - ‘Train the trainer’
  - Provide assistance for upgrading and repairing
Cultural differences
  o Afraid of change
  o Schools can accomplish a lot on their own, with small means
    o Can solve problems on their own
    o No problem to donate old computers
  o Need to customize the delivered software language
  o Shortage and lack of computers at schools

5.2 School A
When analyzing the collected material from the three interviews, it is evident that the school are positive towards using computers. WD describes that he thinks that computers are a good educational tool, and that computers can make the life of the teachers a lot easier. Both WC and WG describe that computers have made it easier for them to both conduct the classes as well as prepare them. With that in mind it is obvious that the personnel at the school share the same positive view towards computers, independent of position. It is also apparent that the staffs of the school show no fear towards implementing new technology into their teaching, or that they want to hang on to their traditional ways. WG says: “All teachers like the idea of starting to use computers, even the old teachers wanted to get knowledge about them and use them” (WG 2012-04-24).

A lack of knowledge about how to use computers to teach the students seems to exist. In most of the cases they today only use the computers in their computer courses and not in any course non-related to computers. If they use computers when teaching, it is in the form of showing the students something, but the students never themselves use the computers in those courses. This is due to the lack of knowledge about how to use computers as educational tools, as well as a lack of funding from the government. As WD says: “The main reason to why we are not using computers regularly as educational tools is because we do not have the budget for it” (WD 2012-04-24).

Even though it is evident that the staffs and students at the school are positive towards using computers as educational tools, they only use the computers in the computer subject. Today computers are only used to teach the students about computers and how to use them and not as a supplement to the teaching in the regular courses. The reason to this is that the regular teachers only have basic knowledge about how to use computers, and not how to use them as educational tools in their classes. WD describes that he feel that the students do not have the required knowledge about computers to start using them as educational tools. WC and WG agree with this, but that it is not a problem as the students are very fast learners when it comes to using computers. Another reason to this can be that WG describes that she does not feel that computers can be used as educational tools in every course, as some courses demand a two-way communication. This points towards that she is not fully aware of how she can use the computers to ease her teaching or what they can help her with.

It is evident that a top-down problem exists when talking to the staff at the school. This top-down problem is not within the school, but between the government and the school. WD argues that the traditional teaching has some fundamental flaws, and the government are mostly at fault for them. The government do not know where focus is most needed
when creating budgets for the schools, which in combination with the fact that the budget are very strict regarding what the schools can use the money for, makes it difficult for the schools to improve their teaching. WD says: “The government only provides a budget for CD-ROMs, but not how to use them or how to improve the teaching” (WD 2012-04-24). The CD-ROMs that the government supply the schools with are also generic, i.e. all schools get the same material, which further strengthen the fact that a top-down problem exists. It is also evident that the government does not know what the schools really need, as WG and WC describe, the CD-ROMs are not really that useful anymore, since the Internet can provide them with a lot better information. It is also interesting when thinking about the reason to why the school got a budget from the government to buy new computers. It was because the government had started to send information to the schools electronically, and not a wish to increase the educational level and quality at the schools. The above mentioned clearly indicates that the schools understand how useful computers are, while the government do not.

When teaching their students about computers today, i.e. in the computer subject, it is evident that the staffs at the schools as well as the government believes that it is important to teach students of all ages about how to use computers. This is confirmed by the fact that the school conduct computer courses for all students independent of grade. These courses get more advanced the higher the grade. It is also evident that the government have started to understand that it is important that the students know how to use a computer, as they are providing a computer subject curriculum. However, they do not seem to understand the importance of teaching the schools about how to use them in the every day education as they only focus on the computer subject.

It is evident that the school was very satisfied with getting computers donated to them, and that the computers have been very useful. Before the school got the computers they did not have the proper technology to teach the students about computers and how to use them, as they only had six very old computers that they barely could use for anything. When they only had those computers, it was only the students that really wanted to learn about computers that managed to do so, i.e. the students that showed that they were interested in learning about computers. A risk connected to this is that the more quiet students may get neglected just because they have a hard time to express their will to learn. By getting computers donated to them, the school could start to teach their students about computers and how to use them. The fact that the school expresses that it was important for them to get computers indicates that they in some ways understand the importance computers can play in today’s education, both to improve their courses as well as how students learn. WC describes that the computers have helped the teachers at the school to create better classes as they now search for information on the Internet to improve their material.

Even though the school was very happy with the donated computers, they did not come without problems. All interviewed staff from the school describe that the computers was helpful, but that they were old and had pretty low specifications. They also describe that some computers did not work and that some lacked some specific hardware parts that were vital for them, e.g. CD-ROM readers. It is evident that this was a great problem for the school, as they did not get any funding or budget from the government to upgrade or
repair the computers. WD describes that out of the 28 computers the Rotary project donated they only managed to get 18 to work. This is a problem as WD describes that the school do not have any budget to repair or upgrade the computers on their own. WD says: “when a computer breaks, we cannot use it anymore” (WD 2012-04-24). With this in mind there is a risk involved with only donating computers without supplying any further assistance, especially old and used ones, as the school might not be able to use them due to them being in poor condition, as without any funding they cannot pay for the required hardware and repairs. Even though the computers may work to start with, there is always the risk of old computers falling apart at a later stage, which also would lead to the school not being able to use them anymore, as they cannot afford to repair them. If old computers are donated, it is important to provide additional services and support to make sure that the school can continue to use the computer even if they need upgrades or repairing. If this is not provided the risk is that the computers become unusable, either because they break or that they no longer can fulfil the task that the school wishes to use them for, due to being too old. It is evident that this is an important aspect as WC describes that because the computers they got from the government was new they included free installation and a 3-year warranty, something that greatly helped them as they did not have any budget for instalment or repairs.

Before the school got computers donated, it is evident that the computer knowledge among the teachers were low. This can lead to problems if only computers are donated without any further assistance, such as training regarding how to use the computers. If a school get computers donated, without having the proper knowledge about how to use them, the risk is that the computers just sit at the school, without being utilized to its fullest. However, in this case the school had a computer teacher that had a lot of knowledge and experience about computers, so they managed on their own, because their computer teacher was willing and wanted to help the other teachers to learn about computers. This is however nothing that can be taken for granted, as there might be schools without anyone that has knowledge about computers. Another important aspect to the need of providing extra support is that WD and WC describe that most of the students before they got the computers had very low computer knowledge. The reason to this is that most of them come from very poor families so they cannot afford to have computers at home. This further strengthens the fact that something more than just donating computers is needed.

After analyzing the collected material, it is evident that the English knowledge at the school is very low. All interviewees at school A describe that almost none of the teachers at the school speak English, but that some of them can read a few words. It is even worse when it comes to the students, as close to no student knows how to read or speak English. It is obvious that this is a problem at the schools as WG describes that it is difficult for her to understand English. When she is searching for information on the Internet, she is only using Thai keywords, as she cannot use English pages. However she does not see any problems with that, as she describes that there is a lot of Thai material available on the Internet. With this in mind, it is obvious that she does not understand how much material that is available in English on the Internet, and as such she miss out on. The same can be said for the students, as they are also limited to using Thai websites when searching for information. WC describes that she wish that the school could have a room
with computers and headphones where the students could learn English by themselves. This is because she thinks that the low English knowledge at the school is a hindrance when it comes to teaching with the help of computers.

Today the teachers at the school create all learning material on their own. When the teachers create and collect their material they use a search engine to gather information for their classes. In this process WG describes that she visits different homepages that she reads through, and if she find more than one page with the same material she consider the content as reliable. WG describes that she do not see any problems related to the way she prepares her classes, and that she do not know if there are other easier ways. From our point of view it is obvious that this is a very time consuming process, where it also can be difficult to ensure the quality of the material. WC describes that if the teachers at the school have material for their classes that are not good enough, she would like a way for them to get access to material from other schools and mix it to create better learning material. This point towards that WC is more aware of that there are certain problems related to the way they are creating their course material today.

Even though the school have received several computers, both from the Rotary driven project as well as through funding from the government, it is obvious that it is not enough to support all their students. WC describes that they can only provide the students with one hour in front of the computers per week, and that they wish that they could provide more hours. But in order for them to provide more hours it is not enough with 30 computers for about 600 students. It is evident that this is a top-down problem as the school do not have the budget to buy more computers, and as such have to depend on donors, which is not a sustainable solution in the long run. The lack of computers is also a reason to why the school cannot use the computers in the every day teaching, and WC describes that their wish is to have computers in each classroom and not only in the computer lab. However this is not possible as they do not have the required budget for that at the moment. An evident problem with having computers in each classroom so that they can be used for teaching is that the teachers’ knowledge about how computers can help is lacklustre. WG describes that the greatest advantages with using computers in the school is that they can play CD-ROMs with learning material as well as search for information on the Internet. This clearly indicates that she do not understand every aspect of what a computer can do to help here improve her classes and help her students. When analyzing the collected material it is evident, as described above, that the staffs of the school are very positive towards computers in the school. Even so, they do have some concerns regarding the introduction of computers, and that is mainly that they are afraid that the student will use the computers to much or that they will visit inappropriate websites. This clearly indicates that there is a lack of knowledge about what the introduction of computers can lead to, both regarding the positive aspects, but also the negative ones. It is also evident that their greatest concern is due to a cultural aspect, as all the interviewed staff emphasised on the fear of the students visiting inappropriate websites. With this in mind it is evident that it is important to both educate the school about the problems, but also about how to prevent them.
It is evident that the teachers at the school struggle with the size of the classes. WG describes that it can be difficult to make sure that each student get the attention that they need, due to the size of the classes. With this in mind it is obvious that there is a shortage of teachers in Thailand. It is also evident that changes in the way classes are performed today are needed for the teachers to be able to handle the amount of students they have.

Concluding remarks:
- The school is positive towards using computers
- Everyone share the same positive view
- Lack of knowledge regarding how computers can be used to teach students
- The school only use computers in the computer subject
  - Teachers only have basic computer knowledge, lack specific knowledge about how to use computers as educational tools.
  - Not fully aware of all the benefits computers can bring to the education
  - Students do not have the required knowledge about computers
- Top-down problems exists
  - Government do not know where focus is most needed
  - Faulty budget priorities
- Important to teach students of all ages about computers
- The school found the donated computers useful
  - Difficult to teach students about computers before handout
  - Too few computers are not useful
- Teachers use the Internet to search for information
- Old computers can pose great problems
  - Expensive to maintain and repair old computers
- No budget to repair computers on their own
  - Important to provide further services and support
- Low computer knowledge among both teachers and students
  - Further assistance is needed if the computers are to be fully utilized
- Poor English knowledge at the school
  - Has to rely on Thai material when searching the Internet, missing out on a lot of English material
- Using search engines when collecting information
  - Difficult to secure the quality of the collected material
- Teachers create learning material on their own
  - Wish to share material with other schools
- Not enough computers to support all students
- No budget to buy more computers
- Cultural difficulties
  - Fear that the students will become addicted to computers and that they will visit inappropriate websites
- Shortage of teachers
5.3 School B

After analyzing the collected material from the three interviewees at the school, it is evident that a top-down problem exists. The main problem for introducing computers into the everyday teaching is mainly due to a budget problem, i.e. faulty priorities. CD describes that some people in the government focuses on different areas than education, as they want to earn money, which an increase in the average educational level cannot supply them with. The problem is also related to culture, as the government may provide a large educational budget but CD describes that about 70 percent of that budget is spent on salaries and buildings instead of trying to develop the educational systems. With this in mind, it is evident that the schools do not have the required money to support computer-aided teaching in their classes, or to buy the required amount of computers. If the school were to get a large amount of computers, without any further support, they would still not have been able to keep them running and up to date, both regarding hardware and software, due to the lack of budget. The interviewed school is an ICT-school, appointed by the government, which means that their ICT-budget is a bit larger than regular schools. Despite this, CD describes that the budget they get is far from enough to support all their needs, as he has to try to get a budget himself to be able to fulfill the schools ICT related needs. CD says: “our school used to get 800 Bath a year to support all our computers, which was way too little, so it was impossible to do anything with that money” (CD 2012-04-23).

It is evident that even though the school is an ICT-school they are not using the computers in their everyday teaching. Instead they mainly use them in their computer subject, to educate the students about how to use computers. CG describes that he very rarely use computers in his classes, - “I only use computers when I want to show something special from a CD, but this only happens about once a month” (CG 2012-04-23). This makes it evident that the teachers can have a hard time to get access to the computer room, as they only have one computer room for about 600 students, so a computer shortage even though it is an ICT school exists. Another aspect of the issue is that the teachers seem to lack knowledge about how computers can help them in their teaching and how they can improve their classes. CG mentions that he thinks his computer knowledge is quite good, because he can use basic programs like Microsoft Word, Excel and the Internet. Another point that makes it evident that the teachers lack in knowledge about how to use computers as educational tools is that CG mentions that the average computer level at the school is good when describing that every teacher knows how to put in a CD-ROM and how to show the content to the students. This shows that the teachers as well as the management do not see all the potential benefits that computers can bring to today’s education. Both CG and CC describe that the only problem with introducing computer-aided teaching is the lack of budget. This clearly indicates that the management and the computer teacher at the school have an inaccurate picture of the general computer knowledge among the regular teachers. With this in mind it is evident that, as said before, a budget problem exists, but that the regular teachers’ of the schools average computer knowledge level also has a large part to play in introducing computer-aided teaching.

As CC describes a main reason to why they cannot use the computers in their everyday teaching is partly because of a budget problem, but also due to a lack of space. CC also
mentions that the school is in need of more computers, but if they were to get more today they would become a burden as the school do not have the required budget to support additional computers. With this in mind it is evident that one cannot just send computers to the school and expect that it is enough as there are more variables to it. There is no use in sending computers to a school, if they do not have the required space to support that amount of computers. CC describes that this could have become a burden for the school instead of helping them, since they do not have the required budget to support the computers nor the required space.

The gathered data from the interviews clearly shows that the general English levels among teachers are low. CC describes that the English level among the teachers are very limited. This means that teachers have to rely mainly on Thai material, which leads to them missing out on a lot of the available content on the Internet. The fact that if the staff have to use English material they have to rely on translation tools, something that can be worrying since it is hard to secure the quality of the translated material. With this in mind it is obvious that is not enough to just provide the schools with learning material or software in English, because it would then be close to impossible for the school to utilize it. CD describes that the general English level among the students are even worse, and that they barely can understand any English at all. This creates problems as the students are limited to only using software and material that are in Thai. This in combination with that CC describes that when the school got their first computers the software only supported English, which made it close to impossible for them to use the computers, makes it evident that a language barrier exists. With this in mind it is evident that it is important to provide material and software that is customized and suited for the specific needs of each school in order for the students and teachers to fully utilize the computers, i.e. use both the material and software.

Even though the school is an ICT school, it is evident, as mentioned above, that the amount of computers they have received is far from enough. With the amount of computers that the school have, it is only possible for them to provide each student with a few hours in front of the computer each week. And these hours are mainly used to teach the students about computers, i.e. the computer subject. CC describes that the specifications of the computers can fulfil their current needs, but the problem is that they have far to few computers to support each student and enable them to get more hours in front of the computers each week. With this in mind it is obvious that the school is in need of a larger budget regarding their computers and how to use them in their regular teaching. As CC mentions, if they would have had more computers it would have been possible for them to use the computers in the regular subjects and not only within the computer subject. Even though this seems to be true, it is also evident that the management of the school believe that they use the computers more than they actually do as of today. CD says: “computers are used to teach students about computers, but also as a teaching tool in the regular subjects” (CD 2012-04-23). In contradiction to this, both CC and CG describe that the computers are mainly used within the computer subjects, and rarely in the regular classes.

It is evident that the students have very low chances of gaining computer knowledge by themselves besides at the school. The reasons for this is mostly because many of the
students come from poor families, and this in combination with the fact that computers are quite expensive, makes it difficult for them to afford to use computers outside of school. It is obvious that it is important to get computers to the schools in the rural areas, and thereby provide the students with the possibility to learn about computers, as they have limited possibilities to do that on their own. With this in mind it is also evident that the students at the rural schools often have a low base computer knowledge level, which stresses the importance of having teachers that know enough about computers to be able to teach the students. This can be a problem since, as mentioned above, the teachers at the school have limited computer knowledge, and they only have one computer teacher to take care of over 600 students.

When the school got their first computers, CD describes that they did not know what to use them for. It is thus obvious that the teachers’ knowledge about computers and how they can help their teaching in some cases are limited. This in turn indicates that it is important to inform the recipient school about what the computer can do for them, and how to use them. CC describes that when they got their first computers, it was difficult to get the other teachers to accept and understand the advantages that computers can provide. The reason to this she describes was that most of the teachers were a bit older, and as such had no intentions to learn about computers. With this in mind it is obvious that a problem exists where it can be difficult to get all the teachers in the rural schools of Thailand to understand the importance of introducing computers into teaching. This further strengthens the importance of informing the staff of the school about what computers can do and how they can help to ease their workload.

When the teachers at the school use the computers to collect material to improve their classes it is evident that it can be difficult to secure the quality of the collected material. CG describes that when searching for information he only uses Google to collect his material for his classes. Even though he describes that he does not feel that this process is time consuming one could argue that to collect information from Google alone and secure its quality is a time consuming process, due to the vast amount of available information on the Internet. CG also describes that he would have wished for a common place where teachers could share their information and class material, i.e. a database, could be useful. With this in mind it is evident that even though CG describes that he thinks that Google fulfils his needs, he would prefer another solution, which would make it easier for him to collect the material for his classes.

It is evident that the education the teachers at the school get about computers is lacklustre in some regards. CD describes that they continuously try to increase the computer knowledge level of the teachers by sending them on educational courses during the summer breaks. Even though CD mentions that the teachers of the school have enough computer knowledge because of that, CG describes that there is a problem among some of the teachers. Almost all of the teachers understand the basics of using a computer, but that they lack the specific program knowledge that would enable them to use computers in their teaching, such as using Microsoft PowerPoint to create learning material for their classes. With this in mind, one could argue that it is not enough to only supply the teachers with general education about how computers work, but also education about how the computers can be used in their education and more program specific education.
CG also describes that he find it important that he and the other teachers at the school get more education about computers and how to use them to teach, not least due to the rapid development of computers today.

CD describes that the school could have used further assistance after receiving the computers, as they did not have the budget to repair and upgrade the computers. In addition to getting financial support, CD describes that some human development assistance could have been needed, enabling the teachers to know more about computers and how to maintain them. As CD describes this would most likely lead to a reduced regarding repairs as the school would have to spend less money on repairing the computers. To give the school some initial financial support can therefore be seen as a short-term solution, while human development assistance is a more long-term solution.

It is obvious that the amount of teachers at the school is not enough to support all the students. CD describes that there is a shortage of teachers at the school compared to how many students they have. This is where computers could help to ease the workload of the teachers of the schools in the rural areas. Even though CD describes that computers are helpful, he do not think that they are the solution to the problem. With this in mind it is evident that CD is not aware of all the possible benefits related to using computers in the education. Another problem related to the lack of teachers is that the government uses a priority system when allocating teachers to the schools, where the largest schools get priority over the smaller ones. This can make it difficult for the schools in the rural areas to find skilled teachers, as this often means that the schools in the larger cities get priority over the smaller schools. Even though the lack of teachers seems to be a great problem, it is not the only problem. CG describes that he do not see the size of the classes alone as a problem, but that it in combination with that the students of each class are different and requires different amount of attention is a problem. He believes that computers can help in that regard, and that they would decrease his and the other teachers workload and make them less tired.

It is evident that the staffs of the school think that it is important to introduce the students to computers at an early age. CC describes that they introduce their students to computers as early as in kindergarten, which clearly indicates that the school find it important to have the computer subject for all students independent of grade. CC also describes that she has yet to see a student that was not exited about learning more about computers, especially since they use computers for that.

The school is overall positive towards introducing computers into the teaching, but they do believe that it can cause some problems. All three interviewees describe that if they introduce computers into the teaching and the students learn more about computers, there is a fear of that the students will use the computers to visit inappropriate websites. CG also describes that he see a risk that the students will become obsessed with the computers, and as such spends less time playing outside. With this in mind it is evident that the schools are not aware of all the possibilities, nor all the negative aspects of introducing computers into teaching. Their greatest problem is most likely due to their culture, where they all fear that the students will visit inappropriate websites. As such education regarding possibilities and limitations with computers and education is required.
Concluding remarks:

- Top-down problems exist
  - Budget problems
  - Faulty priorities; focus on other areas than improving the education
- Cultural problem; not trying to develop the educational system
- Not using computers in every day teaching
  - Computer shortage
  - Cannot afford to repair and maintain the computers on their own
  - Teachers lack the knowledge regarding how computers can help them in their teaching
- Teachers and management do not see all potential benefits of computers
- Lack of space
  - Cannot support more computers with the current budget
  - Cannot just send computers
- Low English knowledge
  - Has to rely on Thai material; missing out on English material
  - Has to rely on translation tools; hard to secure the quality
- Cannot only provide material or software in English
- Difficult to use computers that only support English language, customization needed
- Far from enough computers at the school
- More computers could enable computer-aided teaching
- Limited computer knowledge among teachers
  - Important to inform them about what computers can do and how to use them.
- Difficult to get teachers to accept and understand the advantages of computers, especially the old teachers
- Using search engines when collecting information
  - Difficult to secure the quality of the collected material
- Teachers create learning material on their own
  - Wish to share material with other schools
- Lacklustre computer education for teachers
  - Teachers only have basic computer knowledge, lack specific knowledge about how to use computers as educational tools.
- Further assistance needed
  - No budget for repairing and maintenance
  - Human development assistance; teach teachers how to repair and maintain computers
- Lack of teachers
  - Computers could help to ease the workload
- Education regarding how to use computers as educational tools are needed
- Important to introduce the students to computers at an early age
- Cultural difficulties
  - Fear that the students will become addicted to computers, and that they will visit inappropriate websites
6 Analysis

This chapter begins with a comparative analysis between the cases, based on the findings presented in chapter 5. The aim of this analysis is to find patterns between the cases and to answers the two sub-research questions: ‘RQ 1.1: What challenges and problems related to the diffusion of e-learning exists in developing countries?’ and ‘RQ 1.2: What are the characteristics regarding effective diffusion of ICT to schools in developing countries?’. The analysis of the two research questions is performed parallel to each other at first and is then divided into the two sub-research questions in the final concluding bullet list. The result presented in the bullet list is based on the comparative analysis as well as from the three bullet lists listed as concluding remarks in chapter 5. The result from the comparative analysis is then used to provide a preliminary answer to the main research question: ‘RQ 1: How should e-learning projects be designed when implemented in developing countries?’ in the form of a set of preliminary guidelines. These guidelines are then validated both theoretically and empirically, i.e. triangulated, to secure the quality of the guidelines and to give a final answer to the main research question.

6.1 Comparative analysis

First of all it is obvious that a top-down problem exists in Thailand. Both the donors and the recipients of the computers seem to agree about the fact that the budgets that the government provide for the schools are lacklustre. The budgets are often too small and too narrow in regards of what they are allowed to be spent on. Those parts that the government choose to prioritise in their budgets are often unfavourable for the schools as they often aim to maintain the current educational system rather than driving it forward. As DH mention, the Thai government have performed a project where they delivered computers to a school that did not have any electricity. This clearly shows that the government perform projects without doing the required research, which often leads to failed projects as the computers cannot be used due to one reason or another.

When comparing the answers from the donors with the recipient schools it is evident that there is a discrepancy regarding how many students one computer can support. The donors believe that one computer can support twenty times the amount of students. Even though the schools describe that the computers have been very helpful they still feel that more computers are needed, as the amount they have now are not enough to support all students with enough computer hours a week. With this small amount of computers it is impossible for the schools to use them in the every day education, and instead they more or less only use them in their computer subject.

Even though the schools describe that they have too few computers today, they still feel that they are useful and have helped them. Both schools describe that before they got computers donated to them and had less than ten computers at the school they could barely use them for anything. With that few computers it is impossible to provide all students with the opportunity to use a computer on their own and get the required computer hours to learn about them.
Another evident issue described by both schools is that they lack the knowledge about how to use the computers as educational tools. Both schools describe that they believe that they have the required knowledge about how to use a computer, but not how they can use the computers as a teaching tool. With this in mind it is evident that the teachers at both schools have the required generic computer knowledge, but that they need more specific education about how to use computers in the everyday education. It is also evident that the teachers are in need of more information about how computers can help them to ease their teaching, as they seem to lack the knowledge about all possibilities that computers can bring. Another existing issue is that the students often come from poor families, which in most cases makes it impossible for them to learn about computers outside of school. With this in mind it is important that the teachers have good enough knowledge about computers so that they can teach their students in a proper way.

Both schools seem to agree about the importance of introducing their students to computers at an early age, an opinion also shared by the donors. The donors describe that they think it is too late to introduce computers into the teaching at a university level, and they believe that it should be done at an early stage in school. At the schools they have computer courses for all their grades, from primary school up to secondary school with different difficulty levels the higher the grade. It is also evident that the government have started to understand the importance of teaching the students about how to use computers, as they are providing the schools with a computer subject curriculum.

Both the recipient schools and the donors seem to agree about that the English knowledge among the schools in the rural areas is a problem. Both schools describe that they have to rely purely on Thai content, as none of them, neither teachers nor students, are capable of understanding English. If they use English material they have to use translation tools, and as such they can have a hard time to secure the quality of the material. One of the schools, school B, describe that the first set of computers they got only supported English, which made it impossible for them to use the computers. This is something that the donors seem to have understood as all the donated computers were delivered with Thai software. The donors also expressed the need of customizing the solution for each school depending on their needs and current situation.

Even though the computers have helped the schools a lot, they did not come without problems. Both schools describe that a great problem for them is to be able to maintain their computers, should they need to upgrade or repair them, as they lack the budget for it. With this in mind, it is evident that both schools could have needed some further assistance when they got the computers, i.e. it is not enough to only give them computers and assume that the recipients can maintain the computers on their own afterwards. Even though it is important that further assistance is given, the donors imply that it is not as easy as just giving them money for maintenance that covers a couple of years. One of the schools, school B, mentions that they would have wished for some human development assistance, to educate their teachers about how to maintain the computers in the best way. If support is not given, one school describes that they will most likely only be able to use the computers for a short while, as they would not have the required money to keep the computers up to date and running.
Another evident problem at the schools is the size of the classes, in combination with a shortage of teachers. At one school it is described that they believe that computers could help to ease the workload of the teachers. It is also described that a need of change regarding how classes are performed exists. One of the teachers at school B describes that he does not see the size of the classes as the main problem, but rather that each student is different and learns in different paces. Despite this, none of the schools mention that they think that computers can be the solution to the large classes and the lack of teachers. With this in mind an existing problem seems to be that the teachers do not have enough knowledge about the benefits that computers can lead to.

The teachers at both schools describe that they are using search engines such as Google, when collecting material for their classes. None of the teachers sees any problem with this way of collecting data; they do not find it time consuming, nor do they have any problems with securing the quality of the gathered material. Despite this the teachers express that they would have liked to be able to share their material with other teachers, as well as getting access to other teachers’ material. With this in mind it is evident that a problem regarding the quality of the learning material can exists, due to the vast amount of material that are available on the Internet, and as such a more reliable way of collecting material would be preferred.

Another important aspect is to perform proper research about the recipient schools before sending computers to them. The donors put a lot of emphasise on doing research about the recipients, as it can be difficult to find worthy recipients due to the vast amount of schools that exists in the rural areas. Just because it feels right does not mean that it will work. One of the donors, DH, describes that the government performed a project where they sent computers to a school without any electricity. One of the recipient schools describes that they would really need more computers in order to start using them as educational tools, but that if they were to get computers today it would become a burden for them. The reason to this is that they lack the required space that they would need if they were to get more computers. This indicates that it is vital to do proper research about the recipients and their current situation. Just as important as it is with proper research about the recipients it is to follow up the project, to make sure that the computers are used as they should. As one of the donors, DK, describes: “anything can happen”.

It is also evident that there is a lack of knowledge regarding both the positive and the negative effects computers can have. Both schools describe that their greatest fear regarding introducing computers into the education is that they are afraid that the students will start to use the computers to visit inappropriate websites. Another issue that the schools describe is that they are afraid that the students will become obsessed with the computers and as such not spend as much time outside anymore. This clearly indicates that the Thai culture plays a part in their fears regarding computers, and that they would need some further education about the different sides of using computers in school. Another cultural difficulty described by one of the donors, DH, is that he often encounters customers that are afraid of change, e.g. they often buy new computers, but refuse to use new software. This clearly indicates that cultural differences and difficulties exist and that it is something that has to be considered when performing projects in developing countries.
Concluding remarks:

RQ 1.1: ‘What challenges and problems related to the diffusion of e-learning exists in developing countries?’

- Top down problems exist
  - Budget problems
  - Faulty priorities
- Discrepancy between schools and donors regarding how many students each computer can support
  - Donors believe that a small amount of computers is enough
  - The schools describe that they have to few computers
- Lack of knowledge regarding how computers can be used as educational tools
  - Need more specific training about how to use computers in the everyday teaching
  - Information regarding how computers can ease teaching is needed
- English knowledge is a problem
  - Limited to Thai content
  - Have to rely on translational tools; difficult to secure the quality of the material
- Difficult for schools to upgrade and repair computers on their own; due to lack of budget
- Large classes
- Shortage of teachers
- Low knowledge regarding the benefits that computers can lead to
- Too many computers can become a burden; due to lack of space and not enough budget to support them.
- Lack of knowledge regarding the positive and negative effects associated with computers
- Fear that students will visit inappropriate websites and become addicted to the computers
- Cultural difficulties
  - Fear of change
- Not as easy as just giving the recipient school money
- Using search engines when collecting information
  - Difficult to secure the quality of the collected material
- Expensive software licenses

RQ 1.2: ‘What are the characteristics regarding effective diffusion of ICT to schools in developing countries?’

- Research about the recipient school is needed, i.e. preliminary investigation
- Follow-ups are important
- Important to introduce computers at an early age
- Important to customize the solutions to fit the recipient schools
- Further assistance about computers are needed
  - Information about how to maintain computers are needed
  - Provide assistance for upgrading and repairing
• Teachers create their own learning material
  o Wish to be able to share and take part of other teachers material
• Further education about different sides of using computers in school is needed.
• Too many computers can become a burden; important to provide the right amount of computers
• Provide customized software
• Provide computers with software
• Provide the recipient school with further support

6.2 Preliminary guidelines

In this section the preliminary guidelines are presented in table 6.1. The designed guidelines are based on patterns identified during the comparative analysis conducted in section 6.1.

Table 6.1: Preliminary guidelines for effective diffusion of ICT and e-learning

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Basic guidelines for diffusion of ICT</strong></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Prioritize elementary schools.</td>
<td>It is important to teach students about computers at an early age in order for them to fully utilize the computers in the future.</td>
</tr>
<tr>
<td>G2</td>
<td>Arrange with transportation at an early stage.</td>
<td>There are risks regarding transportation in developing countries due to e.g. poor infrastructure. It is therefore important to find a transportation solution in advance to avoid any unnecessary problems.</td>
</tr>
<tr>
<td>G3</td>
<td>Perform a preliminary investigation.</td>
<td>It is important to do a preliminary investigation about the recipient school to secure that they can support and utilize the computers.</td>
</tr>
<tr>
<td>G4</td>
<td>Provide education about how to use computers in advance.</td>
<td>Teachers and students have low basic knowledge about computers. It is therefore required to educate the teachers at the schools about how to use the computers, if the computers are to be utilized to their fullest. The reason to why it should be done in advance is so that the recipients can start to use the computers immediately after receiving them.</td>
</tr>
<tr>
<td>G5</td>
<td>Customize the handout to fit the recipient school.</td>
<td>There is a need for the handout to be customized as the situation at schools can differ, e.g. poor Internet connection or lack of space.</td>
</tr>
<tr>
<td>G6</td>
<td>Provide the school with appropriate software.</td>
<td>In addition to supplying schools with computers it is also important to provide them with the required software, as they got limited possibilities to obtain software by themselves.</td>
</tr>
<tr>
<td>G7</td>
<td>Adapt the software language to fit the recipient school.</td>
<td>As the language knowledge can be limited at schools in rural areas, it is important that the provided software support a language that the recipient school can use.</td>
</tr>
<tr>
<td>G8</td>
<td>Consider cultural differences.</td>
<td>Cultural differences exist which can hinder the diffusion of computers as an educational tool, e.g. a fear of change. Cultural aspects therefore need to be taken into consideration.</td>
</tr>
<tr>
<td>G9</td>
<td>Provide computers that fulfil the recipient school’s needs and expectations.</td>
<td>Schools have different needs and might want to use the computers for different purposes, e.g. some want to use them for computer subjects while some want to use them as educational tools. The computers therefore need to be adapted to suit the needs of the school.</td>
</tr>
<tr>
<td>G10</td>
<td>Secure that the computers can be used over a long period of time.</td>
<td>As the schools have limited budgets for upgrading and repairing the computers, it is important to provide them with means to help them keep the computers up-to-date and working.</td>
</tr>
<tr>
<td>G11</td>
<td>Send enough computers to fit the school’s situation and needs.</td>
<td>It is not enough to only give each school a few computers to solve the educational problems today. More computers are needed so that the school can provide each student with at last a few hours in front of a computer each week.</td>
</tr>
<tr>
<td>G12</td>
<td>Do not send more computers than the school can handle.</td>
<td>As the schools have budget problems it is important to not send more computers than the school can handle. With the budget problems, a space problem also exists, which can make it difficult for the schools to set up all the donated computers.</td>
</tr>
<tr>
<td>G13</td>
<td>Perform follow-ups after the handout.</td>
<td>To secure that the computers are working and are being used as intended, it is important to perform follow-ups after the handout.</td>
</tr>
</tbody>
</table>

**Enabling guidelines for diffusion of e-learning**

| G14 | Provide information about how to use computers as educational tools. | Information about how computers can help ease the everyday education is needed if the computers are to be used as educational tools. |
| G15 | Provide information about pros and cons regarding computers in education. | Teachers seem to lack the knowledge about the pros and cons related to using computers as educational tools. More information regarding this is therefore needed. |
| G16 | Provide teachers with more program specific education. | The teachers of the schools today often only have basic knowledge about computers. If the recipient school is to introduce computer-aided teaching, more program specific education is needed. |
| G17 | Provide a way to enable sharing of learning material. | Teachers have little or no possibilities to share learning material with other teachers. A way that enables the teachers to share learning material is therefore needed. |
| G18 | Provide the schools with means to collect high quality information. | The schools are using inefficient methods to collect material for their classes. Therefore a need exists to educate the school about how to collect high quality data from different sources. |
| G19 | Provide the school with enough computers to be able to support each student. | If the schools are to start using computers as educational tools it is important that they have enough computers to support each student. |

When conducting the comparative analysis it became evident that the diffusion of e-learning to and within developing countries is dependent on a working technical infrastructure, i.e. that ICT have been successfully diffused and implemented. With this insight in mind we decided to divide the guidelines into two different categories. The first
set of guidelines (G1-G13) is listed as basic guidelines for diffusion of ICT, which means that they all are required if the diffusion of ICT is to be effective. The last set of guidelines (G14-G19) is instead listed as enabling guidelines for diffusion of e-learning, which means that they can help enable effective diffusion of e-learning, if they are implemented in addition to the basic guidelines.

6.3 Theoretical validation

To ensure the quality of the guidelines a theoretical validation of the created guidelines is performed and presented below. Each guideline will be compared against the theoretical framework, and get confirmed or rejected by existing theories.

Table 6.2: Theoretically validated guidelines G1-G3 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Prioritize elementary schools.</td>
<td>Confirmed by theory</td>
<td>It is important to teach students about computers at an early age in order for them to fully utilize the computers in the future.</td>
</tr>
<tr>
<td>G2</td>
<td>Arrange with transportation at an early stage.</td>
<td>Confirmed by theory</td>
<td>There are risks regarding transportation in developing countries due to e.g. poor infrastructure. It is therefore important to find a transportation solution in advance to avoid any unnecessary problems.</td>
</tr>
<tr>
<td>G3</td>
<td>Perform a preliminary investigation.</td>
<td></td>
<td>It is important to do a preliminary investigation about the recipient school to secure that they can support and utilize the computers.</td>
</tr>
</tbody>
</table>

**G1 - Focus on elementary schools.**
Guideline G1 is confirmed by theory. In chapter 3.5.2 Nayak and Kalyankar argued that it is important to get an IT integration into the education at an early age as this can help improve several aspects of early childhood education practice, and this is in line with our guideline about the importance of targeting elementary schools.

**G2 - Arrange with transportation at an early stage.**
In chapter 3.2.1 Blake and Quiros Garzon argued that whenever ICT is implemented with development in focus there are multiple human, technical and physical elements and social, economic, political, infrastructural and ecological dimensions which can evolve in an unpredictable way. With this in mind, it is evident that guideline G2 is confirmed by theory, as they describe that infrastructural problems can evolve in unpredictable ways.

**G3 - Perform a preliminary investigation.**
Guideline G3 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.
Table 6.3: Theoretically validated guidelines G4-G6 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic guidelines for diffusion of ICT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Provide education about how to use computers</td>
<td>Confirmed by theory</td>
<td>Teachers and students have low basic knowledge about computers. It is therefore required to educate the teachers at the schools about how to use the computers, if the computers are to be utilized to their fullest. The reason to why it should be done in advance is so that the recipients can start to use the computers immediately after receiving them.</td>
</tr>
<tr>
<td></td>
<td>in advance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G5</td>
<td>Customize the handout to fit the recipient</td>
<td>Confirmed by theory</td>
<td>There is a need for the handout to be customized as the situation at schools can differ, e.g. poor Internet connection or lack of space.</td>
</tr>
<tr>
<td></td>
<td>school.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G6</td>
<td>Provide the school with appropriate software.</td>
<td></td>
<td>In addition to supply schools with computers it is also important to provide them with the required software, as they got limited possibilities to obtain software by themselves.</td>
</tr>
</tbody>
</table>

**G4 - Provide education about how to use computers in advance.**

In chapter 3.5.3 Andersson and Grönlund argued that the technological confidence of people in developing countries can be a challenge. As people in rural areas within developing countries often have limited access to IT and as such limited experiences with computers, it can be a major hindrance for learning. It was also described that this is especially evident with students that are entirely new to computers.

Rogers in chapter 3.3.3 mentioned that the learning process often involves the need of guidance from another individual because it can be close to impossible to learn everything about a new technology on your own. Therefore it is important that the right amounts of resources are available to support the learning process, as it is critical for the new technology to be fully adopted and utilized. Rogers also added that it is unlikely to increase the computer usage only by handing out computers; he claims that training also needs to be provided for it to increase.

With the above mentioned in mind, guideline G4 is confirmed by theory.

**G5 - Customize the handout to fit the recipient school.**

Guideline G5 is confirmed by theory, as Andersson and Grönlund in chapter 3.5.3 described another challenge: localization, as the importance to think about to what extent the technology and software should be adapted in order for it to fit local culture and languages. In chapter 3.2.4 Pagram and Pagram described that the one-size-fit-all systems do not work, as they have been developed in developed countries.

Blake and Quiros Garzon in chapter 3.2.1 argued that ICT alone cannot improve peoples’ lives, but that it has to be taken into consideration in a broader perspective with strategies specifically tailored to make most use of the tools and techniques in order to fully utilize the potential benefits for human development.
G6 - Provide schools with appropriate software.
Guideline G6 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

Table 6.4: Theoretically validated guidelines G7-G9 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic guidelines for diffusion of ICT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G7</td>
<td>Adapt the software language to fit the recipient school.</td>
<td>Confirmed by theory</td>
<td>As the language knowledge can be limited at schools in rural areas, it is important that the provided software support a language that the recipient school can use.</td>
</tr>
<tr>
<td>G8</td>
<td>Consider cultural differences.</td>
<td>Confirmed by theory</td>
<td>Cultural differences exist which can hinder the diffusion of computers as an educational tool, e.g. a fear of change. Cultural aspects therefore need to be taken into consideration.</td>
</tr>
<tr>
<td>G9</td>
<td>Provide computers that fulfil the recipient school’s needs and expectations.</td>
<td></td>
<td>Schools have different needs and might want to use the computers for different purposes, e.g. some want to use them for computer subjects while some want to use them as educational tools. The computers therefore need to be adapted to suit the needs of the school.</td>
</tr>
</tbody>
</table>

G7 - Adapt the computer software language.
Guideline G7 is confirmed by theory. In chapter 3.5.3 Andersson and Grönlund described that it is important to think about to what extent the technology should be adapted in order for it to fit the local culture and languages. Andersson and Grönlund also described that when implementing e-learning in developing countries issues regarding the choices of technologies, the cost of using the technologies, and how and in which language they are accessible exists.

G8 - Consider cultural differences.
The study of Pagram and Pagram, mentioned in chapter 3.2.4, showed that a lot of the students were positive towards using technology in the education as a whole, but that many of them was against using e-learning as the sole education medium. Pagram and Pagram argued that this stem from that a lot of the Thai culture and believes are taught in the classroom, and as such this is something that the Thai people want to preserve.

Another aspect to the cultural differences, described by Siemens in chapter 3.4.2.1, is that blended learning provides the best opportunities for learning transition from classroom to e-learning and that the method is very effective as it adds efficiency to classroom instructions and allows increased discussions or information review outside the classroom. In the same section (3.4.2.1), La ting argued that blended learning allows organizations to move learners from traditional classroom learning to Internet learning in small steps, which makes the transition easier to accept. This can all be seen as effects of cultural values and beliefs that exist in most developing countries.

In section 3.5.3 Andersson and Grönlund argued that it can be a challenge to diffuse e-learning to cultures where learners only acts as receivers. In these cultures the students
are dependent on the teacher and are used to being spoon-fed, which is a known obstacle to e-learning. With the above mentioned in mind, guideline G8 is confirmed by theory.

**G9 - Provide computers that fulfil the recipient school's needs and expectations.**
Guideline G9 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

**Table 6.5: Theoretically validated guidelines G10-G13 (Basic guidelines)**

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Basic guidelines for diffusion of ICT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G10</td>
<td>Secure that the computers can be used over a long period of time</td>
<td>Partially confirmed by theory</td>
<td>As the schools have limited budgets for upgrading and repairing the computers, it is important to provide them with means to help them keep the computers up-to-date and working.</td>
</tr>
<tr>
<td>G11</td>
<td>Send enough computers to fit the school's situation and needs.</td>
<td></td>
<td>It is not enough to only give each school a few computers to solve the educational problems today. More computers are needed so that the school can provide each student with at last a few hours in front of a computer each week.</td>
</tr>
<tr>
<td>G12</td>
<td>Do not send more computers than the school can handle.</td>
<td></td>
<td>As the schools have budget problems it is important to not send more computers than the school can handle. With the budget problems, a space problem also exists, which can make it difficult for the schools to set up all the donated computers.</td>
</tr>
<tr>
<td>G13</td>
<td>Perform follow-ups after the handout.</td>
<td></td>
<td>To secure that the computers are working and are being used as intended, it is important to perform follow-ups after the handout.</td>
</tr>
</tbody>
</table>

**G10 - Secure that the computers can be used over a long period of time**
Guideline G10 is partially confirmed by theory. Williams and Eyo in chapter 3.5.3 argued that an important challenge to overcome is to keep the costs of the implementation of e-learning at a level that is affordable by developing countries, and as such one could argue that it can be difficult for the schools to secure the use of computers over a long period of time one their own.

In chapter 3.2.2 Manochehri, Al-Esmail and Ashrafi argued that a need for more training facilities in ICT exists and that the costs associated with ICT projects is too high in order for developing countries to be able to afford them. With this in mind they argued that professional advice and consulting services should be offered for free or at an affordable cost. As such it becomes evident that the cost of maintaining computers can become an issue for the schools in the rural areas of developing countries.

**G11 - Send enough computers to fit the schools situation and needs.**
Guideline G11 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.
G12 - Do not send more computers than the school can handle.
Guideline G12 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

G13 - Perform follow-ups after the handout.
Guideline G13 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

Table 6.6: Theoretically validated guidelines G14-G16 (Enabling guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enabling guidelines for diffusion of e-learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G14</td>
<td>Provide information about how to use computers as educational tools.</td>
<td>Confirmed by theory</td>
<td>Information about how computers can help ease the everyday education is needed if the computers are to be used as educational tools.</td>
</tr>
<tr>
<td>G15</td>
<td>Provide information about pros and cons regarding computers in education.</td>
<td></td>
<td>Teachers seem to lack the knowledge about the pros and cons related to using computers as educational tools. More information regarding this is therefore needed.</td>
</tr>
<tr>
<td>G16</td>
<td>Provide teachers with more program specific education.</td>
<td></td>
<td>The teachers of the schools today often only have basic knowledge about computers. If the recipient school is to introduce computer-aided teaching, more program specific education is needed.</td>
</tr>
</tbody>
</table>

G14 - Provide information about how to use computers as educational tools.
In chapter 3.5.3 Andersson and Grönlund described that having access to the technology is not enough. A student also need the required computer skills and to feel confident in using computers. As people in rural areas within developing countries often have limited access to IT and as such limited experiences with computers, it can be a major hindrance for learning. Andersson and Grönlund described that this is especially evident with students that are entirely new to computers. With this in mind it is evident that a need to educate exists, and as such guideline G14 is confirmed by theory.

G15 - Provide information about pros and cons regarding computers in education.
Guideline G15 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

G16 - Provide teachers with more program specific education.
Guideline G16 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.
Table 6.7: Theoretically validated guidelines G17-G19 (Enabling guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Theoretical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Enabling guidelines for diffusion of e-learning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G17</td>
<td>Provide a way to enable sharing of learning material.</td>
<td>Confirmed by theory</td>
<td>Teachers have little or no possibilities to share learning material with other teachers. A way that enables the teachers to share learning material is therefore needed.</td>
</tr>
<tr>
<td>G18</td>
<td>Provide the schools with means to collect high quality information.</td>
<td></td>
<td>The schools are using inefficient methods to collect material for their classes. Therefore a need exists to educate the school about how to collect high quality data from different sources.</td>
</tr>
<tr>
<td>G19</td>
<td>Provide the school with enough computers to be able to support each student.</td>
<td></td>
<td>If the schools are to start using computers as educational tools it is important that they have enough computers to support each student.</td>
</tr>
</tbody>
</table>

**G17 - Provide a way to enable sharing of learning material.**
Nayak and Kalyankar in chapter 3.5.2 argued that by using e-learning in rural areas costs can be reduced because e-learning environments are less expensive to produce and distribute and because it enables e.g. standardization, resource sharing and increased productivity. Nayak and Kalyankar also described that e-learning can make management and administration easier by facilitating the distribution of learning, training, learner support and general administration. The fact that Nayak and Kalyankar mentioned that resource sharing and the distribution of learning, and that it can be made easier with the help of e-learning, confirm guideline G17. As such it is confirmed by theory.

**G18 - Provide the schools with means to collect high quality information.**
Guideline G18 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.

**G19 - Provide the school with enough computers to be able to support each student.**
Guideline G19 was not mentioned in theory, and as such it did not get any validation from theory. The reason for this can be that little research has been done within the area with the same focus as our study.
6.4 Empirical validation

Below an empirical validation of the created guidelines is performed (described in chapter 2.3). This is to ensure the quality of the guidelines and to make sure that they are accepted by a person that are conducting projects within the same field that this study is performed. Each guideline will be complimented with information acquired during the validation interview.

Table 6.8: Empirically validated guidelines G1-G3 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Prioritize elementary schools.</td>
<td>Confirmed through empirical test</td>
<td>It is important to teach students about computers at an early age in order for them to fully utilize the computers in the future.</td>
</tr>
<tr>
<td>G2</td>
<td>Arrange with transportation at an early stage.</td>
<td>Confirmed through empirical test</td>
<td>There are risks regarding transportation in developing countries due to e.g. poor infrastructure. It is therefore important to find a transportation solution in advance to avoid any unnecessary problems.</td>
</tr>
<tr>
<td>G3</td>
<td>Perform a preliminary investigation.</td>
<td>Confirmed through empirical test</td>
<td>It is important to do a preliminary investigation about the recipient school to secure that they can support and utilize the computers.</td>
</tr>
</tbody>
</table>

G1 - Focus on elementary schools
The result of the empirical validation clearly shows that it is important to focus on the younger students, as that is often where the need of help is largest. By providing students with computers at an early age it enables them to use computers throughout their education.

Guideline G1 is confirmed through the empirical validation.

G2 - Arrange with transportation at an early stage
The empirical validation clearly shows that it is important to have an intelligent and thought-out plan about transportation at an early stage. This is because it can be a time consuming and expensive process to start working on transportation solutions at later stages of the project, as anything can happen.

Guideline G2 is confirmed through the empirical validation.

G3 - Perform a preliminary investigation.
It is important to have some sort of contact with the recipient prior to the handout. It is important to know information about for example how many students there are, what kind of space that exists, what they want to use the computers for and their previous knowledge about computers. Another important aspect to performing a preliminary investigation is that one can never know how serious a recipient is, which creates a need to gather information about them.

Guideline G3 is confirmed through our empirical validation.
Table 6.9: Empirically validated guidelines G4-G6 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic guidelines for diffusion of ICT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Provide education about how to use computers in advance.</td>
<td>Partly confirmed through empirical test</td>
<td>Teachers and students have low basic knowledge about computers. It is therefore required to educate the teachers at the schools about how to use the computers, if the computers are to be utilized to their fullest. The reason to why it should be done in advance is so that the recipient school can start to use the computers immediately after receiving them.</td>
</tr>
<tr>
<td>G5</td>
<td>Customize the handout to fit the recipient school.</td>
<td>Confirmed through empirical test</td>
<td>There is a need for the handout to be customized as the situation at schools can differ, e.g. poor Internet connection or lack of space.</td>
</tr>
<tr>
<td>G6</td>
<td>Provide the school with appropriate software.</td>
<td>Partly Confirmed through empirical test</td>
<td>In addition to supply schools with computers it is also important to provide them with the required software, as they got limited possibilities to obtain software by themselves.</td>
</tr>
</tbody>
</table>

**G4 - Provide education about how to use computers in advance.**

The empirical validation shows the importance of educating the recipients about computers in advance. What it also shows is that it is equally important to continually educate the teachers at the schools, either through distance courses or in person at the schools. It also shows that it can be difficult to train all the staff at a school, and as such a train the trainer program is proposed, where one or two teachers are trained. They are then responsible for training the rest of the teachers at the school.

Guideline G4 is partially confirmed through our empirical validation. The empirical validation adds the need of providing education continuously.

**G5 - Customize the handout to fit the recipient school.**

It is important that some thought is put behind the handout process at all times. One cannot randomly perform a project, nor do the exact same things for all recipients. Some improvisation along the way is most likely needed, as the situation at different schools might differ.

Guideline G5 is confirmed through our empirical validation.

**G6 - Provide schools with appropriate software.**

The empirical validation shows that it is important to provide basic software, and possibly even some e-learning material, along with the computers. However, software can be very expensive, so it is important to try and find collaboration with a software company to be able to provide the software. With this in mind it is evident that it is important to provide the schools with the appropriate software, but the empirical validation also adds a need to find a solution to providing the schools with that software.

Guideline G6 is partially confirmed through our empirical validation.
<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G7 - Adapt the software language to fit the recipient school.</td>
<td>Partly confirmed through empirical test</td>
<td>As the language knowledge can be limited at schools in rural areas, it is important that the provided software support a language that the recipient school can use. Guideline G7 is partially confirmed through our empirical validation. The empirical validation shows that English is a problem in Thailand, but that to supply software in English can enable the students to learn more English by using the computers. The empirical validation confirmed that it can be important to adapt the language of the provided software, but it might not always be the best way to provide it in the native language.</td>
</tr>
<tr>
<td></td>
<td>G8 - Consider cultural differences.</td>
<td>Confirmed through empirical test</td>
<td>Cultural differences exist which can hinder the diffusion of computers as an educational tool, e.g. a fear of change. Cultural aspects therefore need to be taken into consideration. Guideline G8 is confirmed through our empirical validation. It is important to take cultural differences into consideration when performing projects in developing countries. The empirical validation shows that for example a fear of change and using new technologies exists in Thailand, which can greatly hinder the diffusion if not considered.</td>
</tr>
<tr>
<td></td>
<td>G9 - Provide computers that fulfil the recipient school’s needs and expectations.</td>
<td>Confirmed through empirical test</td>
<td>Schools have different needs and might want to use the computers for different purposes, e.g. some want to use them for computer subjects while some want to use them as educational tools. The computers therefore need to be adapted to suit the needs of the school. Guideline G9 is confirmed through our empirical validation. It is important to have a dialogue with the management of the school to find out how their curriculum looks like, but also to get to know their short-term and long-term goals. With this in mind it is important to evaluate what the school need and based on that send computers that can fulfil the schools needs.</td>
</tr>
</tbody>
</table>
Table 6.11: Empirically validated guidelines G10-G13 (Basic guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic guidelines for diffusion of ICT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G10</td>
<td>Secure that the computers can be used over a long period of time</td>
<td>Confirmed through empirical test</td>
<td>As the schools have limited budgets for upgrading and repairing the computers, it is important to provide them with means to help them keep the computers up-to-date and working.</td>
</tr>
<tr>
<td>G11</td>
<td>Send enough computers to fit the school’s situation and needs.</td>
<td>Confirmed through empirical test</td>
<td>It is not enough to only give each school a few computers to solve the educational problems today. More computers are needed so that the school can provide each student with at least a few hours in front of a computer each week.</td>
</tr>
<tr>
<td>G12</td>
<td>Do not send more computers than the school can handle.</td>
<td>Confirmed through empirical test</td>
<td>As the schools have budget problems it is important to not send more computers than the school can handle. With the budget problems, a space problem also exists, which can make it difficult for the schools to set up all the donated computers.</td>
</tr>
<tr>
<td>G13</td>
<td>Perform follow-ups after the handout.</td>
<td>Confirmed through empirical test</td>
<td>To secure that the computers are working and are being used as intended, it is important to perform follow-ups after the handout.</td>
</tr>
</tbody>
</table>

**G10 - Secure that the computers can be used over a long period of time.**
To provide further support is an important aspect. It is important to understand that it can be too expensive to send people to provide the support, as well as problems with logistics. As such different solutions for providing support need to be found. One possible solution could be to educate people at the schools about how to solve the most basic problems on their own.

Guideline G10 is confirmed through the empirical validation.

**G11 - Send enough computers to fit the schools situation and needs.**
The empirical validation clearly shows that it is important to send enough computers to the schools. There are two aspects to sending too few computers. One is that the schools will have a hard time to use the computers to anything useful, and the other aspect is the logistical cost. It can be just as expensive to send five computers, as it is to send 30.

Guideline G11 is confirmed through the empirical validation.

**G12 - Do not send more computers than the school can handle.**
It is easy to believe that one is helping just by sending computers to a school. But it is important to take into consideration that one has to be professional as well. If too many computers are sent there is a chance that they cannot be utilized as they are meant to.

Guideline G12 is confirmed through the empirical validation.

**G13 - Perform follow-ups after the handout.**
It is important to perform follow-ups to a project, as it is important to make sure that the donated computers still are at the school and are being used. To make this process easier
marking of the computers is important so that they can be traced. Guideline G13 is confirmed through the empirical validation.

**Table 6.12: Empirically validated guidelines G14-G16 (Enabling guidelines)**

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G14</td>
<td>Provide information about how to use computers as educational tools.</td>
<td>Confirmed through empirical test</td>
<td>Information about how computers can help ease the everyday education is needed if the computers are to be used as educational tools.</td>
</tr>
<tr>
<td>G15</td>
<td>Provide information about pros and cons regarding computers in education.</td>
<td>Confirmed through empirical test</td>
<td>Teachers seem to lack the knowledge about the pros and cons related to using computers as educational tools. More information regarding this is therefore needed.</td>
</tr>
<tr>
<td>G16</td>
<td>Provide teachers with more program specific education.</td>
<td>Confirmed through empirical test</td>
<td>The teachers of the schools today often only have basic knowledge about computers. If the recipient school is to introduce computer-aided teaching, more program specific education is needed.</td>
</tr>
</tbody>
</table>

**G14 - Provide information about how to use computers as educational tools.**
It is important to get the schools to understand that a computer is more than an electronic typewriter. Computers are incredible educational tools, and as such it is important to educate about their advantages and how to use them as educational tools.

Guideline G14 is confirmed through the empirical validation.

**G15 - Provide information about pros and cons regarding computers in education.**
Computers can be powerful tools, but they also come with pros and cons. It is important to teach the schools about ethical and legal problems with using computers and that everything that is done on the Internet will have consequences.

Guideline G15 is confirmed through the empirical validation.

**G16 - Provide teachers with more program specific education.**
It is important to understand the educational goals of each grade, and based on that see what kind of specific training each of the teachers need. Training solutions could be either train the trainer or to provide the training via Internet.

Guideline G16 is confirmed through the empirical validation.
Table 6.13: Empirically validated guidelines G17-G19 (Enabling guidelines)

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Empirical validation</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Enabling guidelines for diffusion of e-learning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G17</td>
<td>Provide a way to enable sharing of learning material.</td>
<td>Confirmed through empirical test</td>
<td>Teachers have little or no possibilities to share learning material with other teachers. A way that enables the teachers to share learning material is therefore needed.</td>
</tr>
<tr>
<td>G18</td>
<td>Provide the schools with means to collect high quality information.</td>
<td>Confirmed through empirical test</td>
<td>The schools are using inefficient methods to collect material for their classes. Therefore a need exists to educate the school about how to collect high quality data from different sources.</td>
</tr>
<tr>
<td>G19</td>
<td>Provide the school with enough computers to be able to support each student.</td>
<td>Partly confirmed through empirical test</td>
<td>If the schools are to start using computers as educational tools it is important that they have enough computers to support each student.</td>
</tr>
</tbody>
</table>

**G17 - Provide a way to enable sharing of learning material.**

It is important to find a way for the teachers at the schools to share their material, as it otherwise could lead to a lot of unnecessary work. One possible solution could be to provide an open source solution where teachers could share material with each other.

Guideline G17 is confirmed through the empirical validation.

**G18 - Provide the schools with means to collect high quality information.**

It is an important aspect to take into consideration that the schools should be able to collect high quality information. The free websites on the Internet does not always provide accurate information, so an alternative solution is needed.

Guideline G18 is confirmed through the empirical validation.

**G19 - Provide the school with enough computers to be able to support each student.**

It is important to supply the schools with enough computers to enable the use of computer-aided teaching. However, it can be difficult to achieve a 1:1 ratio both due to the cost of it, and that the schools might not have the required space to support it. It is instead proposed to find a suitable level, e.g. 1:3 ratio that can be enough to support the school’s needs. This level should be based on the schools current need and future goals.

Guideline G19 is partially confirmed through the empirical validation. Guideline G19 will be modified to propose a suitable student-to-computer ratio instead of supplying each student with a computer each, as that might be too expensive and difficult for schools to support.
7 Discussion

In this chapter the contribution of the findings and result of the study in relation to existing theories, i.e. to clarify the knowledge contribution of the study, are discussed. In addition to discussing the knowledge contribution to existing theories the value for practitioners within the chosen research area are discussed. The purpose of the chapter is to place our finding within a larger context.

One of the most important knowledge contributions of our study is the created guidelines, as they add knowledge to an area where little previous research has been performed. Most of the previous research performed regarding the area of e-learning has focused on identifying problems related to the diffusion, and on the diffusion of e-learning from a developed country to developing countries instead of within developing countries. In addition to this the theories do not explicitly state that the focus is on making the diffusion process as effective as possible. Our created guidelines instead aim to enable the diffusion both within and between developing countries as well as making it as effective as possible, and as such it is an important knowledge contribution, as it adds new dimensions to the research area.

Another identified aspect is that we have identified the need to divide the diffusion process into different phases. Before it is possible to diffuse e-learning to developing countries, there is a need to get a working technical infrastructure up and running, i.e. diffusion of ICT, at the schools of the rural areas of developing countries, as well as educating them about computers. This insight made us realize that before e-learning can be utilized in developing countries there is a need to first create a mature ground on which e-learning in later stages can be implemented based on.

The first step before ICT can be diffused to schools in developing countries is the need to educate the staff of the schools about how to use computers and how to maintain them, and after that it is possible to create a working technical infrastructure at the schools. The next step in the diffusion process of e-learning is to educate the staff about how to use computers as educational tools, and after that is done it is possible to provide them with software to help enable e-learning at the schools in the rural areas of developing countries. Just as with the first step in the diffusion process where it is important to create a working technical infrastructure it is equally important to create a mature ground on which the diffusion can be based. All these above mentioned phases contribute to enable the diffusion of e-learning to rural areas of developing countries. The fact that we have come to the insight that the diffusion of technology to developing countries should be divided into phases can be seen as a contribution to Rogers’s theory ‘Diffusion of Innovations’ (described in chapter 3.3) as it adds a new aspect to the theory.

The above mentioned also made us divide the created guidelines into two categories; basic guidelines for the diffusion of ICT and enabling guidelines for the diffusion of e-learning, as we believe that they are both equally important when it comes to the diffusion of computer-aided teaching to and within developing countries. The theories regarding challenges related to IT-supported learning in developing countries (described in chapter 3.5.4) mention that a hindrance to the diffusion of e-learning to developing countries is the lack of a working technical infrastructure. Even though this is mentioned,
none of the diffusion theories in chapter 3.3 mention that the diffusion of ICT, i.e. to get a working technical infrastructure in place, is an important aspect that must be fulfilled to effectively diffuse e-learning to and within developing countries. The fact that we have identified that the diffusion of ICT to developing countries act as a base to enable the diffusion of e-learning to and within developing countries can be seen as an important knowledge contribution to the theories regarding diffusion. These findings contribute to Rogers’s diffusion theory ‘Diffusion of Innovations’ (described in chapter 3.3) as they show that the diffusion of one innovation can be highly dependent on a successful diffusion and adoption of another innovation before the diffusion of the innovation can begin.

Another mentioned challenge in chapter 3.5.3 is that the curriculum of schools in rural areas often are not suited and adapted for e-learning, which also is a problem that we have identified. In addition to this top-down problem we also found that a budget problem due to faulty priorities by the government seems to exist in developing countries. Our findings clearly indicate that a top-down problem exists in developing countries that can have implications on the diffusion of e-learning. These findings are important knowledge contributions to the theories regarding challenges presented in the chapter 3.5.3 as this aspect is not mentioned by any of the included theories. These budget problems have also led to us identifying additional problems not mentioned in theory; schools in rural areas often have difficulties to be able to support and maintain the computers required for e-learning. This has lead to us identifying a need to supply the schools with further support, as they are unable to handle that on their own. The schools cannot afford to repair or maintain their computer with the limited budgets provided by the government, and as such an important aspect to consider is to provide the schools with alternate ways to be able to support the computers now and in the future. This knowledge contribution adds further insights to the existing theories about challenges related to IT-supported learning in rural areas of developing countries described in chapter 3.5.3 (e.g. theories by Andersson and Grönlund, Williams and Eyo and Lujara)

Another evident issue based on the top-down problem is that teachers seem to lack the required education about how to use computers as educational tools, as well as lacking in basic knowledge about computers. The teachers only get basic education about how to use a computer, but not program specific education that can help them to use computers as educational tools. However, the basic education they receive is far from enough, as they only get education about once a year, which is not enough due to the rapid development of technology. The fact that we have identified the need of both improved basic education about computers as well as more program specific education can be seen as important knowledge contributions to theories regarding the diffusion of IT (described in chapter 3.3) as none of the included theories mention anything about this issue. The knowledge contribution is further strengthened by the fact that an effective diffusion process is highly dependent on the recipients’ knowledge about the technology, i.e. innovation.

In addition to providing education about how to use computers, we have also identified the need to provide the schools with information about the pros and cons related to the use of computers, both in general and as educational tools. None of the theories included
in the theoretical framework explicitly mentions that the need to educate about pros and cons exists. However, both the ‘Diffusion of Innovations’ and ‘TAM’ (described in chapter 3.3) mention that the perceived usefulness of an innovation affects the adoption rate and how well it is accepted by the recipients. With this in mind it is evident that the identification of the need to inform the recipients about the pros and cons, as well as providing information about how to avoid the cons, can be seen as important knowledge contribution to existing diffusion theories as it affects the adoption rate. These insights can be seen as important contributions to existing technological diffusion and adoption theories, i.e. Rogers’s ‘Diffusion of Innovation’ theory and the ‘Technology acceptance model’ (described in chapter 3.3).

Another important aspect that we identified during our research is the importance of introducing computers to students at an early age, i.e. in elementary schools. This aspect is also mentioned in our theoretical framework. However the reason for theories mentioning the importance of introducing computers in early life differs from the ones we identified in our research. The theories focus solely on social aspect such as opportunity to support and enhance children’s learning and playing experiences. In addition to this we identified that by introducing students to computers in an early age, it is possible to create better conditions for them to be able to utilize the computers as educational tools in the future. As this is an enabler for the diffusion of e-learning between and within developing countries it is an important knowledge contribution to Nayak and Kalyankars theory about how IT can support learning in rural areas (described in chapter 3.5.2).

A problem that we identified during our research was that it is not as easy as just sending computers to schools and expects them to be able to use and support the computers. This is another problem related to the above mentioned budget problem as this prevents the schools to support a large amount of computers. This budget problem can lead to the schools not having the required space for the amount of computers required, but also that they do not have the money to support, i.e. repair and maintain, a large amount of computers; supplying a large amount of computers can become a burden for the recipient school instead of helping them. With this in mind it becomes evident that it is of great importance to perform a proper investigation about the recipient schools before handing out computers to make sure that they will be able to support the supplied amount. This insight can be seen as an important knowledge contribution as none of the diffusion theories described in chapter 3.3 explicitly mention the need to perform a proper preliminary investigation in connection to the diffusion process, nor that computers can become a burden for the schools. The fact that we have identified a challenge regarding that the schools can have difficulties to support the needed amount of computers for e-learning can be seen as an important knowledge contributions to theories about challenges regarding IT supported learning in rural areas (described in chapter 3.5.3). To perform a proper investigation about the recipients in diffusion projects is another important knowledge contribution that adds to Rogers’s theory ‘Diffusion of Innovations’ (described in chapter 3.3) as it is an important aspect of the diffusion process.
To perform follow-ups after the project to secure that the school can and are using the computers and software is another important aspect that we identified during our research. This aspect is something that Rogers does not mention in his theory ‘Diffusion of Innovations’, and as such it is an important knowledge contribution to the theory as without proper follow-ups it can be difficult to ensure that the donated hardware and software is being used the way it was meant to. By performing follow-ups on a regular basis the risk of a project failure is reduced as it gives the donors a better control over the process after the handout.

In our research we have identified logistics as a factor that can affect the diffusion process in a negative way, as it can be difficult to arrange with transportation to the recipient schools. Problems related to the infrastructure in developing countries are also mentioned in the theories describing challenges related to IT-supported learning in rural areas (described in chapter 3.5.3). However, none of the theories mentions the need of arranging with the transportation at an early stage. If one does not arrange with transportation at an early stage there is a risk that great problems will arise during later stages. It is therefore of utter importance to think about transportation and transportation problems at an early stage of a diffusion project. The fact the we have identified that it is important to think about logistical problems and how they can affect the project at an early stage can be seen an important knowledge contribution to existing diffusion theories, e.g. Rogers’s theory ‘Diffusion of Innovations’ (described in chapter 3.3).

Another aspect that we have identified during our research is characteristics for effective diffusion of ICT in developing countries. This is an aspect that none of the theories in the theoretical framework mention. By adding information about what characterizes a successful diffusion project the chances of failing a project reduces, as it, in combination with knowledge about challenges and problems, can make it easier to foresee difficulties that can arise when conducting diffusion projects. With this in mind, the identification regarding characteristics becomes an important knowledge contribution to the theories regarding diffusion, described in chapter 3.3, as it is something that can greatly affect the outcome of a diffusion project.

In addition of adding to existing theories, our findings and result also affects the target audience of our study (described in chapter 1.5). The result from our study will be of interest to practitioners as previous research in combination with our findings shows that there are a large amount of challenges related to the diffusion of e-learning to rural areas of developing countries. As such the fact that our findings have helped to create general guidelines for effective diffusion of e-learning to and within developing countries can help practitioners to provide successful e-learning implementations to these countries, as the guidelines have been developed with these challenges in mind.

The fact that we have identified that the diffusion of e-learning is highly dependant on the diffusion of ICT, have provided the insight that it is not as easy as just diffusing e-learning to developing countries as they often lack the required technical infrastructure. This is another aspect that the result of our study can provide the practitioners with, and we believe that this insight can help them to successfully diffuse e-learning to and within developing countries in the future. As mentioned above, we have identified the need to divide the diffusion process into different phases; the need to educate in advance of the
diffusion of technology. This is yet another aspect that practitioners have to take into consideration when initiating diffusion projects in developing countries.

The result of our study will also have some effects on the other part of our target audience; researchers. This as the result of the study has resulted in a set of general guidelines for effective diffusion of e-learning that can act as a base for further research as the guidelines will need to be tested in other setting than the one of our cases.
8 Conclusions, evaluation and further research

In this chapter the conclusions of the study are presented, followed by an evaluation of the chosen evaluation criteria (described in chapter 2.4.3), a method evaluation and suggestions for further research.

8.1 Conclusions

The conclusions have been divided into three parts based on the research questions of the study. First the answers to the two sub research questions are presented, followed by the answer to the main research question, i.e. a presentation of the final guidelines, which have been created with the help of the two sub questions.

8.1.1 What challenges and problems related to the diffusion of e-learning exists in developing countries?

When talking about challenges and problems related to the diffusion of e-learning in developing countries, one apparent challenge is that top-down problems seem to exist. The school budgets supplied by the governments are often very strict regarding what they can be spent on. This poses a problem to the diffusion of e-learning as the government often focuses on maintaining the educational system instead of developing it. These faulty priorities regarding the budgets also pose problems for the schools when it comes to repairing and upgrading their computers, as they do not have the budget for it.

As the schools often have budget problems it can be difficult for them to maintain their equipment. This poses another problem, as a need to provide support for repairs and upgrading of the equipment is needed to ensure that it can be used over a long period of time. However, it is not as easy as just giving money as support, as one can never know how serious a school is and what they are going to use the money for. This creates as challenge since the people providing the solutions must come up with an alternative funding system, in order for the schools to be able to use the computers over a long period of time.

It is also evident that the infrastructure of the country can be a hindrance when it comes to effective diffusion of e-learning in developing countries. This includes both the traditional infrastructure as well as the technical infrastructure of the country. Even if a country has a working infrastructure with a working road network, high transportation costs can still be associated with the logistics of diffusion projects. High transportation costs and difficulties regarding logistics become even more apparent with countries that have poor infrastructure and bad road networks. The technical infrastructure can also pose problems regarding the diffusion of e-learning in developing countries as many schools in the rural areas have poorly developed technical infrastructure. A well-developed technical infrastructure is a must have if the diffusion of e-learning are to succeed in developing countries.

Another part that can pose a problem is the average computer knowledge among the teachers at the schools in developing countries. This is worrying as it clearly indicates that it is not enough to only supply schools with hardware and software to support e-learning. If only hardware and software are supplied there is a high risk that the school
will not be able to utilize the received equipment, due to lack of knowledge about how to use it. Another factor that can have a negative impact on the diffusion of e-learning to schools in the rural areas is that teachers lack the knowledge about how to use computers as educational tools. It is important to provide the schools with appropriate information as they otherwise will not be able to utilize the computers as educational tools, due to the fact that they are not aware of the benefits that computers can provide to the education. Another difficulty connected to the teachers’ knowledge is that many of them lack knowledge about the pros and cons related to computers in general. This creates problems for the people providing the solutions because it is a risk that the recipient schools cannot utilize all benefits that computers can bring or prevent the cons.

Another great challenge related to the diffusion of e-learning to and within developing countries is that there is a shortage and lack of computers at the schools in the rural areas. This can pose a problem as the diffusion of e-learning is highly dependant on the existence of computers. Even if the school have computers, the amount is often too small to be able to support the use of computers as educational tools. However, it is not as easy as just providing the schools with more computers, as they often have a budget problem, which leads to them not being able to support any large quantities of computers. Another problem that exists is that the schools often do not have the required space where they can keep and use the supplied computers. These risks must be taken into consideration as the risk is that more computers otherwise can become a burden for the recipient schools instead of helping them. These are challenges that greatly can hinder the diffusion of e-learning to schools in the rural areas of developing countries.

Software licenses are expensive, something that can pose a great problem for the recipient schools as they have very limited chances to afford the required software licenses on their own. This is mainly due to faulty priorities by the government, and as such the schools do not get the required budget for software. The fact that schools in the rural areas of developing countries cannot afford to buy software becomes a challenge for the people providing the computers, as it is not enough to only provide computers. An important challenge for the people providing the computers is therefore to come up with a solution to the license problem as the recipient schools need to be provided with appropriate software in order to be able to utilize the benefits of e-learning.

Another challenge associated with the diffusion of e-learning in developing countries is that different language barriers can exist. The fact that the language skills among people in the rural areas sometimes is lacklustre can pose a problem since one can not take for granted that all recipients can understand and use generic software provided in e.g. English. A need of customization regarding the language of the provided software is as such in many cases needed. This in turn can pose a problem for the people providing the solutions, as it will mean an increased cost to customize the software solutions to fit each school.

Cultural difficulties are another challenge that can create great problems when it comes to diffusing e-learning to and within developing countries. It is evident that people at the rural schools have been coloured by culture and that it affects both how they reason and their values. An example of this is that people can be afraid of change. This also creates a
need to identify cultural differences and values that can affect the diffusion in a negative way. Cultural difficulties must therefore be taken into consideration, because if it is not there is a great chance that the provided equipment will not be utilized. The solutions must therefore be adapted to fit the culture of each school and country if they are to be utilized to their fullest.

Another challenge is that students at the schools often come from poor families, and as such they have a hard time to learn about computers outside of schools, which leads to their knowledge about computers being limited. This creates problems for the people providing the solutions, as it is important that the students have the required knowledge to be able to utilize the technology, and as such a solution to the low knowledge among the students is needed.

8.1.2 What are the characteristics regarding effective diffusion of ICT to schools in developing countries?

For the diffusion of ICT to schools in developing countries to be effective several factors have to be taken into consideration. An effective ICT diffusion project is characterized by that the solution providers have met the following points:

- Performed a preliminary investigation about the recipient to find out about the situation at the recipient school. E.g. what the school aim to use the computers for, and what kind of possibilities regarding space they have to support computers.
- Performed follow-ups continuously after the solutions have been provided to the schools to make sure that the solutions are being used the way they are meant to be used, and that they are working as intended.
- Provided the school with the right amount of computers to fit its needs, i.e. not too few and not too many.
- Provided the school with appropriate software along with the computers, to make sure that the schools can use the computers successfully.
- Provided computers and software that has been adapted to fit the recipient school, e.g. customized language.
- Provided the recipient schools with further support to enable them to repair and maintain the computers for a period of time that extends beyond the immediate weeks after the handout.
- Provided the schools with education about how the computers can and should be used.
- Have informed the staff and tried to make sure that they understand the benefits associated with computers.
- Provided the schools with computers that have high enough standard to be able to fulfill the schools needs and wishes with the computers.
- Have arranged and solved transport problems in advance, and have had a thought out plan about the logistics.
8.1.3 How should e-learning projects be designed when implemented in developing countries?

The final guidelines are presented in table 8.1 below. These guidelines are normative and designed to answer the main research question about how e-learning projects should be designed when implemented in developing countries. The table consists of two parts; basic guidelines for diffusion of ICT (G1-G13) and enabling guidelines for diffusion of e-learning (G14-G19). The reason for dividing the guidelines into basic and enabling guidelines are that we have come to the insight that the diffusion of e-learning is dependent on a working technical infrastructure, i.e. that ICT successfully have been diffused. The guidelines listed as basic for diffusion of ICT can therefore be seen as the foundation on which the enabling guidelines for diffusion of e-learning are dependent. In addition of being dependent on another innovation, there is a need to divide the diffusion process into phases, as it is vital to provide information and education about the technology in advance of the implementation for it to be successful.

Table 8.1: The final guidelines for effective diffusion of ICT and e-learning to and within developing countries.

<table>
<thead>
<tr>
<th>No</th>
<th>Guideline</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Basic guidelines for diffusion of ICT</strong></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Prioritize elementary schools.</td>
<td>Students in rural areas have few possibilities to learn about computers on their own. As such it is important to teach students about computers at an early age to create as good opportunities as possible for them to use computers as educational tools in the future.</td>
</tr>
<tr>
<td>G2</td>
<td>Arrange with transportation at an early stage.</td>
<td>There are risks regarding transportation in developing countries due to e.g. poor infrastructure. It is therefore important to find a transportation solution in advance to avoid any unnecessary problems.</td>
</tr>
<tr>
<td>G3</td>
<td>Perform a preliminary investigation.</td>
<td>It is important to do a preliminary investigation about the recipient school to secure that they can support and utilize the computers.</td>
</tr>
<tr>
<td>G4</td>
<td>Provide education about how to use computers in advance as well as continuously.</td>
<td>Teachers and students have low basic knowledge about computers. It is therefore required to educate the teachers at the schools about how to use the computers, if the computers are to be utilized to their fullest. The reason to why it should be done in advance is so that the can start to use the computers immediately after receiving them. It is also important to provide some education continuously to make sure that the knowledge is up-to-date.</td>
</tr>
<tr>
<td>G5</td>
<td>Customize the handout to fit the recipient school.</td>
<td>There is a need for the handout to be customized as the situation at different schools can differ, e.g. poor Internet connection or lack of space and different needs and wishes.</td>
</tr>
<tr>
<td>G6</td>
<td><strong>Provide the school with appropriate software.</strong></td>
<td>In addition to supplying schools with computers it is also important to provide them with the required software, as they got limited possibilities to obtain them by themselves. As software is expensive it is important to find a solution that makes it possible to provide the schools with software, e.g. find sponsors.</td>
</tr>
<tr>
<td>G7</td>
<td><strong>Adapt the software language to fit the recipient school.</strong></td>
<td>As the language knowledge at schools in rural areas can be limited, it is important that the provided software support a language that the school can use. However one must consider to which extent the customization needs to be done as the use of software in non-mastered languages can in some way help user to develop basic knowledge about the language.</td>
</tr>
<tr>
<td>G8</td>
<td><strong>Consider cultural differences.</strong></td>
<td>Cultural differences exist which can hinder the diffusion of computers as an educational tool, e.g. a fear of change. Cultural aspects therefore need to be taken into consideration.</td>
</tr>
<tr>
<td>G9</td>
<td><strong>Provide computers that fulfil the recipient school’s needs and expectations.</strong></td>
<td>Schools have different needs and might want to use the computers for different purposes, e.g. some want to use them for computer subjects while some want to use them as educational tools. The computers therefore need to be adapted to suit the needs of the school.</td>
</tr>
<tr>
<td>G10</td>
<td><strong>Secure that the computers can be used over a long period of time.</strong></td>
<td>As the schools have limited budgets for upgrading and repairing the computers, it is important to provide them with means to help them keep the computers up-to-date and working.</td>
</tr>
<tr>
<td>G11</td>
<td><strong>Send enough computers to fit the school’s situation and needs.</strong></td>
<td>It is not enough to only give each school a few computers to solve the educational problems today. More computers are needed so that the school can provide each student with at least a few hours in front of a computer each week.</td>
</tr>
<tr>
<td>G12</td>
<td><strong>Do not send more computers than the school can handle.</strong></td>
<td>As the schools have budget problems it is important to not send more computers than the school can handle. With the budget problems, a space problem also exists, which can make it difficult for the schools to set up all the donated computers.</td>
</tr>
<tr>
<td>G13</td>
<td><strong>Perform follow-ups after the handout.</strong></td>
<td>To secure that the computers are working and are being used as intended, it is important to perform follow-ups after the handout.</td>
</tr>
</tbody>
</table>

**Enabling guidelines for diffusion of e-learning**

| G14 | **Provide information about how to use computers as educational tools.** | Information about how computers can help ease the everyday education is needed if the computers are to be used as educational tools. |
| G15 | **Provide information about pros and cons regarding computers in education.** | Teachers seem to lack the knowledge about the cons related to using computers. It is therefore needed to educate the staffs at schools about pros and cons regarding computers in education. |
| G16 | **Provide teachers with more program specific education.** | The teachers of the schools today often only have the basic knowledge about computers. If they are to introduce computer-aided teaching more program specific education is needed. |
Provide a way to enable sharing of learning material. Teachers have little or no possibilities to share learning material with other teachers. A way that enables the teachers to share learning material is therefore needed.

Provide the schools with means to collect high quality information. The schools are using inefficient methods to collect material for their classes. Therefore a need exists to educate the school about how to collect high quality data from different sources.

Provide the school with enough computers to be able to support computer-aided teaching. If the schools are to start using computers as educational tools it is important to find a suitable student-to-computer ratio. It is important that this ratio is in line with the schools current and future goals.

**8.2 Evaluation**

*In this section the evaluation of the evaluation criteria described in chapter 2.4.3 are performed, to secure the quality of the study. The evaluation of the quality criteria are followed by a method evaluation that aims to evaluate the chosen research method.*

**8.2.1 Evaluation criteria**

**Credibility**

During the research process we have worked towards creating a high credibility. This has been done in multiple ways. First of all we have used different way of triangulation to increase the credibility of our findings. This triangulation process has consisted of several steps, where the first step was to include different cases in the case study, as well as studying the cases from multiple points of view. By doing so the credibility of our findings increased as it made it possible to use data from different cases and views to create a result that was in line with all findings.

The above mentioned triangulation in combination with an analysis of the triangulated material resulted in a preliminary result. To further increase the credibility of the preliminary result, another type of triangulation was used. This triangulation process was performed by comparing the preliminary results against theory, i.e. a theoretical validation, as well as through the use of a semi-structured interview with a person involved in diffusion projects in developing countries, i.e. an empirical validation. The aim with both the theoretical and the empirical validation was to increase the credibility by comparing the result with previous theoretical findings as well as against a practitioner’s view.

Even though we have been working hard towards increasing the credibility of our result, the study has been performed in Thailand, where the general English knowledge is low. This might have affected the credibility of our findings in a negative way, as it forced us to use an interpreter when performing our interviews. All our questions and every answer had to go through our interpreter and as such we had to rely on that all questions and answers had been properly understood. To offset this difficulty in some ways we used a highly educated interpreter that had a master’s degree, with which we spent an entire day discussing our research and goals to make sure that we had a unified view of what we were trying to achieve.
Transferability
As we have conducted a qualitative case study it can be difficult to ensure a high transferability of our findings. However as the aim of our result was to be applicable in developing countries in general and not only in Thailand, it was important for us to work against creating as high transferability as possible, given our circumstances.

One of the methods used when trying to create a higher transferability was to give a detailed description of our collected material and cases. This was in line with Oates (2006) who describes that a ‘thick’ description can help to create a higher transferability because it enables the readers to judge whether their own situation of interest has similar features so that the findings could be relevant there too. The fact that we have conducted a case study with multiple cases has also helped to strengthen the transferability as the findings are not as narrow as if the study only had been based on a single case.

Internal reliability
As we are two researchers we have been working towards creating a high internal reliability in our results. To increase the internal reliability of our findings, we have continuously throughout the entire research process worked together and always had discussions about our research to make sure that we have had a shared view about our studied area and findings. In the case of different opinions we have had discussions about the differences to create a unified view, something that was important to secure the quality of our findings and results.

One limitation connected with internal reliability and our study is that the entire study has been conducted with the help of an interpreter. Even though we have had discussions about the aim of our views with the interpreter, one cannot be totally sure about that the interpreter shared the same view and standpoint as we did.

Confirmability
As the study has been a qualitative case study, it can be difficult to ensure complete objectivity. However, throughout the entire research process we have tried to leave our personal values and opinions out of the research as much as possible. This has been an important aspect as we have created guidelines that can be applied to more areas than the studied case.

When analyzing and drawing conclusions about the collected material, we have tried to leave personal opinions and values out of the work process to make sure that the these opinions and values did not affect the collected material. As we have performed an inductive research, it has also been important for us to make sure that theories in our theoretical framework has been left out and not affected our results. This was important as it enabled the preliminary guidelines to be based solely on our collected empirical material, and as such be as representative as possible for our studied cases.

As with the evaluation criterion internal reliability the use of an interpreter can affect the criterion of confirmability, because we have had no control over how the interpreter asks the questions as we have no knowledge about the indigenous language. It has also been difficult to not be affected in any way by the theories included in the theoretical framework.
Generalizability
During the research our focus has been on creating general guidelines that are applicable on developing countries in general, not only in Thailand. It has therefore been important for us to work towards creating as high generalizability as possible, given our circumstances and type of research strategy.

To ensure that the developed guidelines can be used in different settings than the studied one, different techniques have been used to increase the generalizability of our finding. First of all we chose to include multiple cases in our case study, which added some breadth to the findings as it made it possible to compare the findings from the different cases, and create guidelines that were based on more than one data source. To add another dimension we also chose to perform interviews with people from different positions as well as interviewing both sides of a diffusion project, i.e. donors and recipients. By doing so it was possible to get the views from different sides of a project, which made it possible for us to identify potential gaps and similarities between the two sides. When creating the guidelines we tried to make them as general as possible. This was done by indentifying the underlying problems to what had been said, something that made the guidelines more general rather than specific for the studied cases. One can also argue that the fact that we have conducted nine interviews increases the possibility of generalizability as it led to large amounts of data about the studied cases.

Even though we have worked hard to create a high generalizability, it is important to understand that the fact that we have conducted a case study, which is narrow and focuses on depth rather than breadth, could have had a negative effect on the generalizability. This as the case studied may be hard to transfer to other cases. One must also consider that Thailand in many ways are more well developed than many of the other developing countries, and can longer be considered as a typical developing country (for details see chapter 2.4.1.1). The fact that the situation in Thailand might differ slightly compared to other developing countries could have had a negative impact on the guidelines since challenges and problems unknown to Thailand might exist in other countries. This problem was hopefully alleviated some by the fact that we conducted both a theoretical and empirical validation of the results and findings, and complemented the guidelines if any contradictions existed.

8.2.2 Method evaluation
We have conducted a qualitative study, which has suited the purpose of our study well as we had to collect rich and detailed data to gain a deeper understanding about the studied cases. This type of data was required for us to be able to answer the research questions of the study. This would not have been possible if we instead had taken on a quantitative approach as we would not have been able to gain the knowledge and understanding about the situation at schools in the rural areas of Thailand.

Throughout the entire research process we have been using an interpretivistic perspective which has led to us continuously trying to gain an understanding about the underlying reasons behind what was being said during the interviews. To gain this understanding we had to interpret what was being said at all times which might have created problems as misinterpretations may have occurred, and this is especially evident since the study was
performed in Thailand with the use of an interpreter. However, we tried to minimize the interpretation errors by conducting both a theoretical and an empirical validation of all findings and results.

The study has been conducted in an inductive manner, which led to us creating the guidelines based solely on the empirical material collected from the interviews. This fitted the purpose well as few studies about diffusion of e-learning to elementary schools in rural areas of developing countries have been performed and it was therefore important for us to create our own theory. This fact also made it evident that it would have been difficult to conduct the study with a deductive approach due to the lack of existing theories to base the study on. As a new theory was created from the collected empirical material it was important for us to test and validate our findings and result. The test was performed both empirically and theoretically, which made it possible to validate our findings from a broader perspective. As the strategy of the study have been to first collect material in an inductive manner, and based on that create a new theory regarding the diffusion of e-learning in developing countries, it was important for us to start by validating our findings against theory. By validating the findings against theory it was possible to further strengthen them as a preparation for a final empirical test. Further empirical tests would have been needed, but as that was outside the scope of the study, only two validation tests have been performed on the findings. These tests were performed to secure the quality and authenticity of the findings and results.

The theoretical framework was included and used in the study for two purposes; as a base when creating the interview guides and to validate the findings through the theoretical validation. The theoretical framework was used when creating the interview guides for guidance about which aspects and areas that had to be considered. By doing so it was possible to secure that no important aspects would be left out during the interviews. The fact that the theoretical framework also was the basis for the theoretical validation made it important that the chosen theories fitted the purpose of the study and the research questions well. This is something that we in retrospect feel that we succeeded with as a lot of the collected empirical material and the analysis of that empirical material seems to be in line with the theoretical framework.

During the study we have been using semi-structured interviews to collect all empirical material. This has suited the purpose of the study well, as it made it possible for us to get some structure on our interviews to make sure that we did not miss any important aspect, as well as giving us some flexibility to add questions or change questions to fit the respondents. It is even more evident that semi-structured interviews were a suitable choice as the study was performed in Thailand with an interpreter. If we instead had used e.g. unstructured interviews or focus groups it would have been difficult to ensure that the collected material was of high enough quality. By using unstructured interviews we would have had to rely solely on that our interpreter would be able to interpret and reproduce everything that had been said during the interview in order for us to be able to collect material of high quality. The same thing can be said about focus groups, but adding the fact that the interpreter would have had to be able to act as the moderator of the focus groups, which would have made us loose to much control over the situation and as such the ability to secure the quality of the material.
8.3 Suggestions for further research

The evaluation of the chosen evaluation criteria, performed in section 8.2.1, led to us identifying limitations and gaps with our study. To fill these gaps we have identified the following need for further research:

First of all the created guidelines will need to be tested to investigate if they can be used in a real-life situation. This is important as the guidelines have only gone through a theoretical and empirical validation but not yet a test in a real-life situation. The fact that only some research has been conducted within the area further stresses the importance of performing a test of the guidelines in a real-life situation as the theoretical validation could lack some important aspects.

Another aspect to the validation of the result is that the guidelines will also need to be tested and validated in different countries. This to investigate whether or not they can be applied to other countries than Thailand, i.e. that the guidelines are general enough to be applied to ‘all’ developing countries as intended. It is important to do this test as the situation between different countries in many cases differs from one another; e.g. the educational systems and how the education is performed, governmental involvement and priorities regarding the educational system and the computer and language knowledge among the indigenous people can differ.

As mentioned earlier, the situation in Thailand is different compared to some developing countries with far worse conditions. In many aspects Thailand is well developed compared to the general developing country, for example the lack of electricity and connectivity is not as apparent as it can be in other developing countries with worse conditions. This creates a need to investigate if the set of guidelines needs to be complemented with additional guidelines as the situations and needs at schools in the rural areas of poorer developing countries might differ from the studied schools in Thailand.

As our research has focused on two different cases, there is a risk that our findings are too narrow. This in combination with the fact that a lot of the previous research within the area has focused on the diffusion of e-learning from a developed country to a developing country can create problems for our suggested framework. A need to focus on the diffusion of e-learning within a developing country, i.e. from schools in urban areas to schools in rural areas therefore exists. This creates a need to further investigate how to enable the diffusion of e-learning within developing countries as the situation between different schools within the same country can differ significantly.

Due to the fact that we had to use an interpreter during the entire research process there is risk that interpretational errors may have occurred, which may have affected the results in a negative way. This further stresses the importance of performing additional research about the same area to investigate if the guidelines are applicable or if additions to the designed guidelines are needed.
References


Appendix A – Interview guide Donors

Start the interview by asking some general questions about the respondent.

Question 1:
In what way were you involved with the project?

Question 2:
Could you describe what you did?

Question 3:
What was the underlying purpose that made you choose to participate in the project?

Question 4:
What were the effects that you wanted to achieve with the project?

Question 5:
Did you feel that those effects were met? If so how? If not, why not?

Question 6:
What did the handout process look like? Did the Thai culture play any part when you decided how to do it?

Question 7:
Have you experience any difficulties during the project?

Question 8:
How have the computers been received and accepted at the schools?

Question 9:
If you were to perform a new handout, would you go about the same way as earlier, or would you do something different?
Appendix B – Interview guide School A

Teachers
Start the interview by asking some general questions about the respondent.

- What is your position at the school?
- What ages do you teach?
- How long have you been teaching?
- How long have you been teaching at the School?

Question 1:
Could you describe how you teach your students today?

Question 2:
Have you noticed any difference from before you got the computers and after, regarding your work, and how the students work, i.e. the daily work.

Question 3:
Do you feel that the computers have helped you?

Question 4:
Have the computers changed the way you can perform your classes?

Question 5:
Could you describe how you got the computers, from your point of view? Did you experience any problems with the way you got the computers? If so, could you describe them, and what do you feel could have been done differently?

Question 6:
Do you feel that you could have used assistance in any way, in regards of getting the computers, and after you got them?

Question 7:
Have you seen any change in your students, in regards of how they learn, and regarding their grades?

Question 8:
Could you describe how the students reacted when you first got the computers?

Question 9:
Could you describe how you and the students use the computers?
**Question 10:**
Do you use computers in the everyday education? If so could you describe how you use them?
If yes:

   How do you get the material you use for computer-supported teaching?
   Do you feel that it could have been made easier in some way?
   Do you experience any language problems regarding the content available?

**Question 11:**
Do you feel that the computers fill your needs? Is the standard high enough? Can they support the activities you want to use them for?

**Question 12:**
How often do you use the computers?

**Question 13:**
Could you describe the students’ experiences and knowledge about computers before you got them?

**Question 14:**
Do you feel that computers are good tools for teaching and support in teaching?

**Question 15:**
Do you see any problems with introducing computer-aided teaching as a complement to the traditional teaching?

**Director**
Start the interview by asking some general questions about the respondent.

   - What is your position at the school?
   - What do you do here at the school?
   - How long have you been at the school?

**Question 1:**
Are you using computers as a teaching tool today?

**Question 2:**
How would you describe the general computer knowledge level among the teachers?
Have you noticed any difference before and after you received the computers?

**Question 3:**
How would you describe the general computer knowledge level among the students?
Have you noticed any difference before and after you received the computers?

**Question 4:**
How would you describe the general English knowledge level among the teachers?
Have you noticed any difference before and after you received the computers?

**Question 5:**
How would you describe the general English knowledge level among the students?
Have you noticed any difference before and after you received the computers?

**Question 6:**
Do you believe that computers are helpful as a complement to the normal traditional teaching?

**Question 7:**
Did you experience any difficulties to start using the computers after they were handed out to you?

**Question 8:**
Have you gotten any further support besides getting the computers? (e.g. education about computers, financial or governmental support)

**Question 9:**
Have you noticed any difference from before you got the computers and after, regarding your work, and how the students work, i.e. the daily work.

**Question 10:**
Do you see any barriers that would make the implementation of computers into teaching difficult?

**Question 11:**
Do you see any problems with introducing computer-aided teaching as a complement to the traditional teaching?
Appendix C – Interview guide School B

Start the interview by asking some general questions about the respondent.

- What is your position at the school?
- What ages do you teach?
- For how many years have you been teaching?
- For how many years have you been teaching at the school?

**Teachers**

**Question 1:**
Could you describe a normal school day at your school?

**Question 2:**
How do you teach your students?

**Question 3:**
Could you describe your experience with computers?

**Question 4:**
Do you have access to computers?

**Question 5:**
How often do you (the school) use the computers?
Do you allow all your students independent of grade to use the computers?

**Question 6:**
Do you feel that the computers fill your needs? Is the standard high enough? Can they support the activities you want to use them for?

**Question 7:**
Are you experiencing any problems with today’s education?

**Question 8:**
Do you feel that computers are helping you in the everyday education?

**Question 9:**
Do you feel that you and the other teachers at your school have enough computer knowledge and experience to be able to use computers in the daily teaching?

**Question 10:**
Do you feel that the students at your school have enough computer knowledge and experience to be able to use computers in the daily learning?

**Question 11:**
Could you describe the students’ experiences and knowledge about computers before you got them?
Question 12:
Do you feel that computers are good tools for teaching and support in teaching?

Question 13:
Do you see any problems with introducing computer-aided teaching as a complement to the traditional teaching?

**Director**

Start the interview by asking some general questions about the respondent.

- What is your position at the school?
- What do you do here at the school?
- How long have you been at the school?

**Introductory question**

Do you have computers? How did you get them?

**Question 1:**
Are you using computers as a teaching tool today?

**Question 2:**
How would you describe the general computer knowledge level among the teachers? Have you noticed any difference before and after you received the computers?

**Question 3:**
How would you describe the general computer knowledge level among the students? Have you noticed any difference before and after you received the computers?

**Question 4:**
How would you describe the general English knowledge level among the teachers? Have you noticed any difference before and after you received the computers?

**Question 5:**
How would you describe the general English knowledge level among the students? Have you noticed any difference before and after you received the computers?

**Question 6:**
Have you gotten any further support besides getting the computers? (e.g. education about computers, financial or governmental support)

**Question 7:**
Did you experience any difficulties to start using the computers after they were handed out to you?
Question 8:
Have you noticed any difference from before you got the computers and after, regarding your work, and how the students work, i.e. the daily work.

Question 9:
Do you believe that computers could be helpful as a complement to the normal traditional teaching?

Question 10:
Do you see any barriers that would make the implementation of computers into teaching difficult?

Question 11:
Do you see any problems with introducing computer-aided teaching as a complement to the traditional teaching?
University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

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

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

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

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