Pilot Tanzania

Introducing computers and Internet in Tanzanian Secondary Education

A case study

By:
Allard Lamain
Centre for Educational Innovation and Technology
Faculty of Technology, Policy and Management
University of Technology Delft
In collaboration with:
Computer Science Department (CSD)
University of Dar es Salaam (UDSM)

Supervisors:
Prof. Dr. W.Veen
Prof. Dr. G.J. de Vreede
Dr. H. Twaakyondo

Amsterdam 2003

Table of contents

Executive summary 4

1. INTRODUCTION AND OBJECTIVES 6
1.1 General background 6
1.2 Objectives & research questions 7
1.3 Research design 9
1.3.1 Case study methodology 9
1.3.2 Data collection 10
1.3.3 Data analysis 12
1.4 Organization of this report 14

2. THE WORLD PROGRAM 15
2.1 History 15
2.2 Achievements 16
2.3 Approach 16
2.4 WorLD partnerships 16

3. THE RESEARCH FIELD SETTING 19
3.1 General Information about Tanzania 19
3.2 ICT development 21
3.3 Tanzanian education system 22
3.4 Tanzania's ICT obstacles in Education 23

4. THE 'WORLD PILOT' TANZANIA 24
4.1 Preparation stage 24
4.1.1 Computer literacy 24
4.1.2 Secondary education method 25
4.1.3 conclusions and implications 26
4.2 Introduction stage 27
4.2.1 WorLD Program stakeholders and opportunities 27
4.2.2 The Two 'WorLD pilot' Schools 31
4.2.3 Participation interest 32
4.2.4 Computer knowledge of participants 33
4.2.5 Description of Sessions 34
4.2.6 conclusions and implications 35
4.3 Running stage 36
4.3.1 within session analysis: Class attitudes 36
4.3.2 cross session analysis: Computer and Internet comprehension 38
4.3.3 cross class analyses 42
4.3.4 Evaluation of the WorLD-pilot sessions 44
4.3.5 within school analyses: 13 critical issues 46
4.3.6 Conclusion 51

5. RECOMMENDATIONS AND CONCLUSIONS 52
5.1 Recommendations 52
5.2 Conclusions 56
5.3 Research limitations 57

List of tables, charts and figures

Figure 1: research questions and design 8
Figure 2: Steps of the WorLD pilot and data collection methods 9
Figure 3: Data analysis scheme of the running stage 13
Figure 4: Map of Tanzania 19
Figure 5: Educational structure in Tanzania 22
Figure 6: cycle of sustainable development causality diagram 28
Figure 7: Computer room StMatthew's Secondary School 31
Figure 8: StMatthew's transportation to CSD 32
Figure 9: students behind beamer 35
Figure 10: Janguani Secondary students in computer lab 37

Table 1: Facts about Tanzania 20
Table 2: stakeholders, concerns, actions and opportunities overview 27
Table 3: Information on schools 31
Table 4: information on the 3 classes 31
Table 5: main class characteristics 36
Table 6: Comprehension difficulty level per class 38
Table 7: Chat session of a 16-year-old boy 40
Table 8: Difference in learning and teaching method 42

Chart 1: Telecommunications development Tanzania 21
Chart 2: Attendance of the WorLD pilot 37
Chart 3: E-mail account statistics 39
Chart 4: Participants Interest on a scale form 0 to 10 41

List of Appendixes

Appendix A: Questionnaires computer knowledge teachers 60
Appendix B: THE CLASS SESSIONS LOG 62
Appendix C: ‘WorLD pilot’ participant computer understanding on a scale from 1 to 10. 64
Appendix D: Sheets of session 1 66
Appendix E: Sheets session 2 70
Appendix F: Sheets session 3 73
Appendix G: Computer, Internet and E-mail Manual for the participants 74
Appendix H: Sheets session 4 78
Appendix I: GEO Game example ‘Clues’ 82
Appendix J: GEO Game answer sheet example 83
Appendix K: e-mail scheme letter from developing countries 84
Appendix L: Post pilot questionnaire for students and teachers 85

Executive summary

This research presents the findings of a project that "Studied the potential opportunities and limitations of the WorLD program in two Tanzanian secondary schools".

The World Links for Development program (WorLD) is a program of the World Bank that connects and trains teachers and students in developing countries to improve education and employment opportunities. WorLD has been recognized as one of the most innovative and successful education programs assisting developing countries in bridging the "digital divide".

This research was carried out in Dar es Salaam and covered a total of six months. A case study approach was used to investigate "how to introduce the World program in a Tanzanian secondary school", with the main objective to identify the critical issues that are to be considered when introducing the World program in a Tanzanian secondary school. Data collection was multi-method, involving interviews, class observation, face-to-face feedback during class, questionnaires and document analyses.

The following became clear:

- Computer literacy of the secondary students and teachers proofed to be low especially in the rural areas.
- The current learning and teaching processes are didactic and teacher centered. Students absorb rather then reflect.
- Besides the schools, and the World Bank, the ministry of education, the Tanzanian government, World Links, local communities and donors are important parties that have to be taken into account.
- Introducing computers and the Internet in Tanzania could provide Tanzania the following opportunities:
    - A cycle of sustainable development
    - Economic growth
    - Socialization of young people and in targeting youth-at-risk
    - The chance to build an own capacity to master and adapt global technologies to local needs
    - To actively take part in the globalization and the rapid technological changes
    - Acceleration in urbanization and a greater regional integration
    - Domestic structural change and a reduction of aid dependency

- Possible negative aspects of the WorLD program:
    - Initially favors few schools only, creating digital divide within country itself
    - The WorLD program is expensive
    - It leaves little room for personalizing the program
    - It can mean drastic cultural consequences
    - ICT technologies can imply new forms of crime
    - Students might be 'negatively influenced' when confronted with inappropriate information found on the Internet.

- The participation interest of headmaster and teachers of the participating schools was big. They fully realized the importance of computers in the developed world, and were very happy participate in the research.
- The participant's class attitudes when running the pilot exceeded expectations; they showed respect, had a lot of patience, listened to the instructor and were very motivated.
- Interaction of the participants between teacher-students, students-teacher, instructor-teacher, instructor-student gradually increased as the sessions progressed.

- The participants had no trouble learning the computer basics; they did have trouble understanding the physical aspects of the Internet. E-mailing, surfing, MSWord, and chatting were understood well amongst 50% of the participants.
- The overall attitude towards the computer and the Internet of the participants differed per topic: The Participants clearly showed a lot of interest in e-mailing, but showed less curiosity towards the history of the computer or learning how to type.
- When integrating computers and the Internet into the Tanzanian secondary classroom there is a shift in teaching and learning methods from teachers centered to students centered, from learning facts to "learning on how to learn".
- Teaching and learning method adaptation amongst participants was divided. A clear distinction could be made between adapting students versus non-adapting students.
- The language barrier (a lot of what can be found is English) should not be underestimated when introducing computers and the Internet in Tanzanian secondary schools.
- The WorLD pilot was very much appreciated by the participants. The Students, the teachers, the head of the schools, and even the parents of the students were very enthusiastic about the WorLD pilot. Both teachers and students clearly indicated that the Pilot had made a significant impact on their knowledge and their worldviews.
- The following critical issues were encountered:
    1. Educational paradigm shift
    2. Lack of computer education material
    3. Lack of National IT policy
    4. Lack of reliable electricity
    5. Lack of good working computers & technical support
    6. Slow to no Internet connection
    7. Difficulty completing computer activities within the school's daily schedule
    8. Corruption
    9. Uncoordinated efforts
    10. Teacher shortage
    11. Rural VS Urban
    12. Internet side effects
    13. Financial shortcomings

Finally, a recommendation is made for a more direct, simple, cheaper and structural project for introducing computers and Internet into the Tanzanian secondary education sector. The project focuses on basic computer and Internet skills training using the resources available. It is recommended that such a project is run prior to implementation of the WorLD program, that has the tendency to become no more then an ordinary computer class, where technology will be used primarily for computer science projects and for the development of specific computer skills. The project leaves space for educational adaptation and for adapting global technologies to local needs; something the WorLD program leaves little room for.

Recommendations are also made for the ministry of culture and education. The current policy concerning ICT in education is not targeting its goal. The ministry should exercise proactive leadership and initiate bold steps to implement their articulated vision of ICT in education. Besides creating a policy the Ministry of education should be actively involved in the implementation, by attending teacher training session, visiting schools, computer classes, students and teachers, so that it will be able to evaluate and adapt its ICT policy for secondary education over the years to come.

Questions and comments, please send to: **Allard@Lamain.nl**

1. INTRODUCTION AND OBJECTIVES

Learning is an overarching issue of any innovation process. As Bengt-Ake Lundvall (1992) puts it; *...the most fundamental resource in the modern economy is knowledge and, accordingly, ... the most important process is learning, ...learning is predominantly an interactive and, therefore, a socially embodied process, which cannot be understood without taking into consideration its institutional and cultural context.*

Technologies drastically reformed the education methods over the last years in developed countries. Students have become information processors; reliable sources of information are identified, effectively accessed, understood, conceptualized, and communicated to colleagues[1]. The students work in teams, and share information across global networks. These important learning innovations due to a revolution in information and communication technology (ICT) however have not manifested itself in developing countries, creating a so-called 'digital divide'.

1.1 General background

Tanzania is working on 'bridging' this digital divide; The publication of a 'Proposal for Tanzania's ICT Policy Formulation Framework' finished in December 2001 by the eSecretariat[2] and the first order draft of the 'National ICT policy of Tanzania' published in may 2002 by the Ministry of Communications and Transport, clearly indicate a booming elevation of ICT awareness within Tanzania. This raise of awareness has attracted an astonishing amount of ICT and education related non-profit organizations to Tanzania over the last years, contributing on bridging the digital divide. Examples of these organizations are the UNDP[3] (Cisco Networking Academy Programme), the IICD[4] (Global teenager) and CICAT[5] (Tanzania: Informatics Education and Mathematical Modeling).

The Tanzanian Ministry of Education and Culture has decided to start introducing the WorLD (World links for development program) program in Tanzania. A program of the World Bank Institute that focuses on bridging the gap in skills, knowledge, and educational opportunities between secondary students in industrialized and developing nations, as well as between rich and poor students within developing countries.

This research presents the findings of a project that "Studied the potential opportunities and limitations of the WorLD program in two Tanzanian secondary schools". It aims at identifying the challenges of implementing the uses of ICT in a developing country's education system. Little is known about the obstacles to assessing information and communication technologies and the diffusion and use of ICTs in developing countries, particularly in the low-income countries[6].

---

[1] Hawkins. Robert. J, Ten Lessons for ICT and Education in the Developing World, 2000

[2] The eSecretariat derives its information from the ethinkTank. The eThinkTank consist of a group of Tanzanians from various walks of life that discus the ICT situation in Tanzania. For more information see http://www.Ethinktanktz.org

[3] For more information see http://www.undp.org/dpa/frontpagearchive/2002/march/05mar02/

[4] http://www.iicd.org/globalteenager/

[5] http://www.cicat.tudelft.nl//PenS/index.cfm?PageID=2764

[6] UNCSTD (United Nations Commission for Science and Technology Development) 1995

1.2 Objectives & research questions

Education resources in Tanzania are insufficient, and people are starting to realize that computers and the Internet could provide the means to improve the quality of education. Computers and the Internet however are scarcely spread throughout Tanzania and are limited to major companies, Internet cafes, and some government institutions only. Most Tanzanian secondary students and teachers have never used a computer. The integration of western technologies into the Tanzanian education is therefore an interesting but relative unknown area. This project was carried out to advise and provide information to those planning and preparing to enter that area; those involved in the integration of ICT in the Tanzanian Secondary education, in particular the Tanzanian Ministry of Culture and Education and the World Bank.

In order to obtain the information needed, this project was designed to investigate "**how to introduce the World program in a Tanzanian secondary school**", with the main objective to identify the critical issues that are to be considered when introducing the World program in a Tanzanian secondary school. These 'critical issues' will serve to clarify the obstacles that need to be taken when introducing ICT's in the Tanzanian secondary education sector.

The specific objectives and the research questions derived from the main objective are as follows:

(i) To identify the parties involved and to assess their concerns and actions.

- What parties are involved, what are their concerns, actions and opportunities?
- What is the participation interest of the schools?
- What is the participation interest of the teachers?

(ii) To assess the learning abilities of the participants concerning computers, the Internet and the projects and to describe the teaching process.

- What is the current education and teaching process of the Tanzanian secondary Schools?
- What is the difference in teaching and learning methods when implementing the WorLD pilot?
- How do the Participants adapt to the teaching and learning difference?
- What is the participant class attitude (attendance, exercises, class participation)?
- What is the quality and quantity of interaction with other participants and with the instructor?
- How does the World program fit into the education curriculum of the schools participating?

(iii) To identify the possible opportunities and limitations to be considered when introducing the World program in Tanzanian secondary schools.

- What are the possible opportunities for Tanzania when implementing the WorLD pilot?
- What are possible negative aspects when implementing the WorLD program in Tanzania?
- What are the educational, organizational, economical and technical constrains?

(iv) To design an implementation strategy on how to introduce the World program in the participating schools, educational wise and technical wise.

- What is the overall computer literacy of the Tanzanian secondary student, and that of the participants?
- What are the participant's difficulties when working with computers and the Internet?
- What is the participants' attitude towards technology?
- What are the thoughts of the participants on the World Program?

(v) To provide recommendations for introducing the computers and the Internet in other Tanzanian secondary schools.

The questions stated above can be classified in 3 different categories. Figure 1 shows what research questions are answered during what stage (The stages are described in the following paragraph) in order to obtain answers to the main research question being:

What are the critical issues that can be identified during the running of a pilot of the WorLD program?

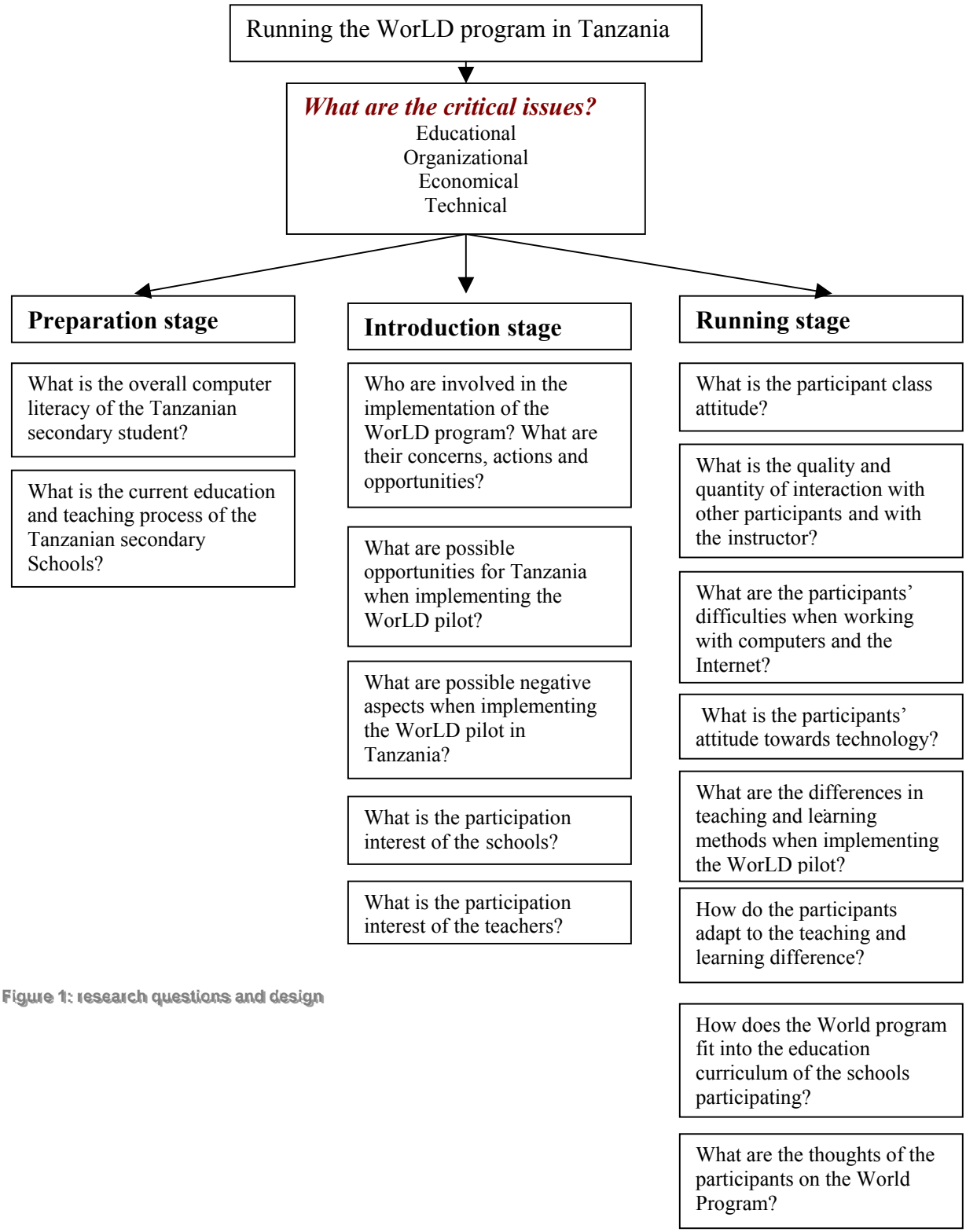


Figure 1: research questions and design

1.3 Research design

This research was carried out in Dar es Salaam, covered a total of six months and consisted of running a 'pilot' of the WorLD program (see chapter 2). Since no preparations were taken prior to the researcher's arrival in Dar es Salaam[7], and since the researcher had little experience with the African culture and none with Tanzanian culture the project literally started from scratch. The researcher had to: "assess the Tanzanian education system, find suitable schools, explain the project to schools, make schedules, design an education plan, prepare classes, make handouts and teach" on one hand, and "do literature studies, create questionnaires, carry out interviews and observe" on the other hand.

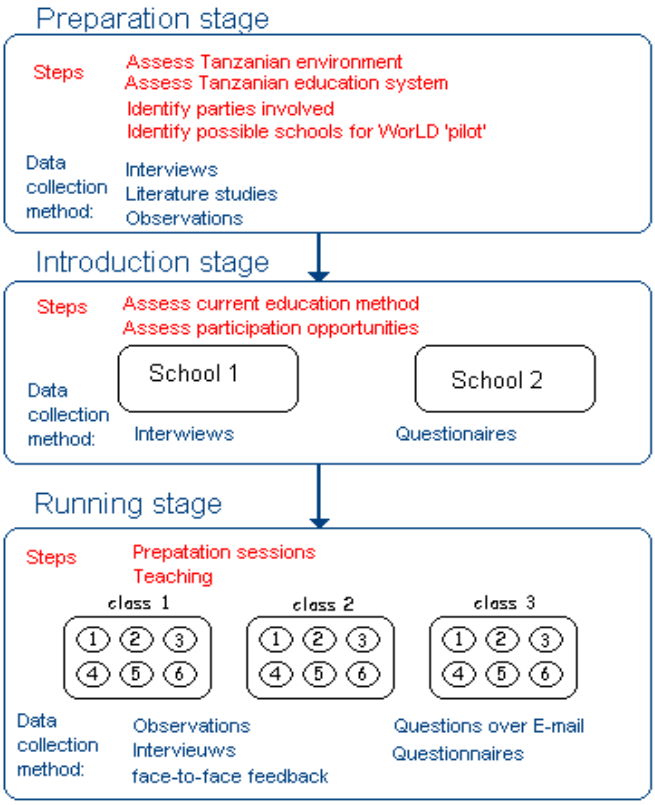


Figure 2: Steps of the WorLD pilot and data collection methods

Due to the size and complexity of the project, three different stages were distinguished within the running of the pilot: the preparation stage, the introduction stage and the running stage (see figure 1). The preparation stage being everything that needs to be done before a school is approached, the introduction phase consisting of approaching the schools to fitting the program, the running stage being the actual 'teaching' of the students and the teachers (students and teachers are being referred to as; participants). The stages are sequential, meaning that the second stage needs the first stage and the third stage needs the second stage (see figure 2).

1.3.1 Case study methodology

According to Robson[8], case study is an appropriate strategy for answering research questions which ask how or why and which do not require control over the events. Due to the nature of this project, a case study approach was used as a guide to this research.
Case study is a method of conducting qualitative research, and while those terms are sometimes used interchangeably, they are not synonymous. Case study research evolved as a distinctive approach to scientific inquiry, partly as a reaction to perceived limitations of quantitative research[9].

[7] Project initiator and supervisor; Dr. R. Mgaya deceased unexpectedly during the preparation stage in The Netherlands.
[8] Robson, C. Real World Research: A Resource for Social Scientists and Practitioner-Researchers. London: Blackwell, 1993.
[9] Gall, M. D., Borg, W. R., & Gall, J. P. (1996). Educational research: An introduction (6th ed.); White Plains, NY: Longman.

1.3.2 Data collection

By using a combination of data collection-strategies, different data sources will be available to validate and crosscheck findings (Patton, 1990)[10]. Case study data collection was therefore multi-method, involving interviews, class observation, face-to-face feedback during class, questionnaires and document analyses. Depending on the stage, one data collection technique was predominant; the others provided supporting information, as is often the case in case study methods[11].

- Preparation stage:

During the preparation stage a literature study was performed to assess the Tanzanian education system. Amongst other things, information was sought about the knowledge of Tanzanian secondary students concerning computers and the Internet. Unfortunately there was very little information at hand on this specific topic. Short quick interviews were therefore held with about 30 University students randomly met around campus who had recently been Secondary School students, and two computer teachers from the Department of Computer Science. They were asked how much they knew about computers and the Internet before coming to the UDSM.

For further expansion of knowledge on the Tanzanian secondary education system, a literature study was conducted on the Tanzanian education culture, primarily focusing on the teaching methods. Classes were also attended and observed at a secondary school to verify the readings. Since the researcher was going to teach Tanzanian students him self at a later point in this project it seemed more than practical. The classes were attended at St Matthew's Secondary School (which was later selected for participation).

Dr. JJ Kyaruzi aided in selecting possible schools for participation. He was familiar with many schools in and around Dar es Salaam. He contacted them by telephone, briefly explaining my project and asking after their interest.

Also part of the preparation stage was a literature study of Tanzania's ICT situation, again primarily focusing on education.

- Introduction stage:

During the Introduction stage, two schools were visited that were selected for possible participation by the researcher and Mr. JJ Kyaruzi. During a staff meeting the headmaster and the teachers were explained the project, and interviewed in order to assess their participation interest. They were also given a written explanation of the research project for further reflection.

Initially it was the intention to visit more schools in order to broaden the choice, but due to the limited time span of the project and the fact that the visited schools met the expectations, the decision was taken to conduct the project with the two schools that were visited so far. The schools were once again visited to make the final arrangements.

[10] Patton, M. Q. Qualitative Evaluation Methods. (2nd ed.) Thousand Oaks, CA: Sage, 1990.
[11] Merriam, S. B. Qualitative Research and Case Study Applications in Education.

Teaching the students and teachers computer basics while they have spent many hours 'surfing the web' already, or teaching them how to set up an e-mail account while they have never switched on a computer was of course to be avoided. The preparation stage had shown that the computer experience strongly differed by school, questionnaires had therefore been send out to inquire about the computer knowledge and Internet awareness of the participants as well as their thoughts and expectations on a program such as this one. These questionnaires were developed with the help of a Tanzanian colleague working at the Department of Computer Science Mr. H Kimaro.

Making a selection of the students and teachers for participation in the pilot was left to the schools. The researcher played no role in it and had set no requirements. The school selected on availability and on a 'first come first serve' basis.

In order to create a better representation of the scope of the WorLD program, a literature study was also conducted during this stage on the main parties involved in a possible implementation of the WorLD pilot. Their concerns, actions where explored, as well as their opportunities. Possible negative aspects of such a program where also looked into.

- Running stage:

The running stage was the most substantial part of the pilot. Initially it was the intention to run the program at the two selected schools. The preparation stage and introduction stage however, had shown little prospect to do so. After considering all possibilities the least time consuming and practical alternative was chosen: conducting the classes at the computer lab at the Department of Computer Science of the UDSM.

For a period of approximately three months, 18 sessions lasting over two hours with three classes consisting out of a total of 93 participants were conducted. The sessions were designed, prepared and taught by the researcher, on four occasions assisted by Mr. I Nnafie.
Multiple data collection methods were used during this stage, the most significant one being observations. Most classes were designed to be project oriented, this created an opportunity for the researcher to observe as a spectator during the sessions. The researcher used an observation sheet for each session, observing for motivation, interest, initiatives, participation, interests and unexpected actions. Since Mr. I Nnafie had assisted four times, he proofread the observations.

A second data collection method during the running stage was open and short interviews concerning the sessions; mostly conducted with the teachers, occasionally with a student. These Interviews were performed immediately after the sessions, digitalized and by chance proofread by the interviewee for confirmation. The short interviews served as a measurement for improving the next sessions and to assess the teachers view on how they thought the session progressed. Teachers and students were asked if they understood well, and what they would like to learn or understand better.

Since it was the same individual conducting the classes and doing the research, the opportunity arose to utilize face-to-face feedback from the participants as a helpful data collection tool. E.g. the reason for some students not comprehending a certain exercise was asked and worked out into great detail. Explanation methods were then adjusted. This tool was mainly used to get life feedback during the sessions, which also helped developing the next session.

As creating an e-mail account was part of the program that was developed this tool was used two ways to collect data: the first one being a check to see how many managed to actually send an e-mail, the second one by sending Q & A by e-mail. Questions about their view on technology and their education were asked. As opposed to interviews, the participants were given time to reflect about the questions asked, the e-mails didn't have to be send off immediately. The answers were used to create a view on the participants' attitude towards technology.

Finally, questionnaires were handed out to all participants after the completion of all sessions, for evaluation of the program. The questionnaires were used to gather information on what the participants liked or disliked about the pilot, what they understood best, and about their general opinion on the WorLD pilot. Once again, the questionnaires were developed with help of Mr. H Kimaro. The questionnaires where handed out during the last session of the pilot, and collected at the schools two weeks later, 64% of the participants restituted the questionnaire.

1.3.3 Data analysis

The data from the literature studies conducted during the **preparation stage** was analytically analyzed and interpreted. A set of assumptions was then made about the computer literacy of the secondary student, about the Tanzanian education system and the parties involved in the WorLD program. These assumptions were then compared and reassured with the data from the interviews and observations. Data from regular Tanzanian class observations was first analyzed and then compared to the observations made by another researcher. All irrelevant data (data not contributing to the research questions from the preparation stage) was temporarily set aside and later analytically analyzed for critical issues.

Data gathered from the closed questions from the questionnaires during the **introduction stage** were put into a spreadsheet and statistically analyzed, to learn about the education method and the computer literacy per selected school. The data from the open questions and the interviews with headmasters were studied into great depth and helped assess the participation interests and the WorLD program expectations of the teachers. The two schools were then cross-analyzed for differences and similarities. Again, all irrelevant data (data not contributing to the research questions from the introduction stage) was temporarily set aside and later analytically analyzed for any missed critical issues.

In order to describe the participants' behavior and learning abilities, data analysis during the **running stage** took place as recommended by Eisenhardt[12]. Starting data analysis with an in-depth study of each session, this first step being called "within-case analysis". This entailed sifting through all the data and observations, discarding whatever was irrelevant and bringing together what seemed most important of each session. The idea was to allow the most significant observations to emerge from all data gathered from the class sessions. After having reduced the data, cross-case analyses of the sessions followed (see figure 3). To facilitate the cross-session analysis, all sessions were observed and described following the same format: a brief introduction describing the attendance, a detailed description of the interaction and participation activities of the students and teachers, a description of their attitudes in general and towards technology. A description of the participants achievements and the learning abilities concerning computers, the Internet and the in class student-project,

[12] Eisenhardt, K. M., Building theories from case study research. Academy of Management Review, 1989

and finally a description of any non-anticipated observations that is relevant to the research was given. As Eisenhardt suggests, such a preliminary analysis is helpful to develop an in-depth understanding of each case (session) before moving on to the next level of analysis.

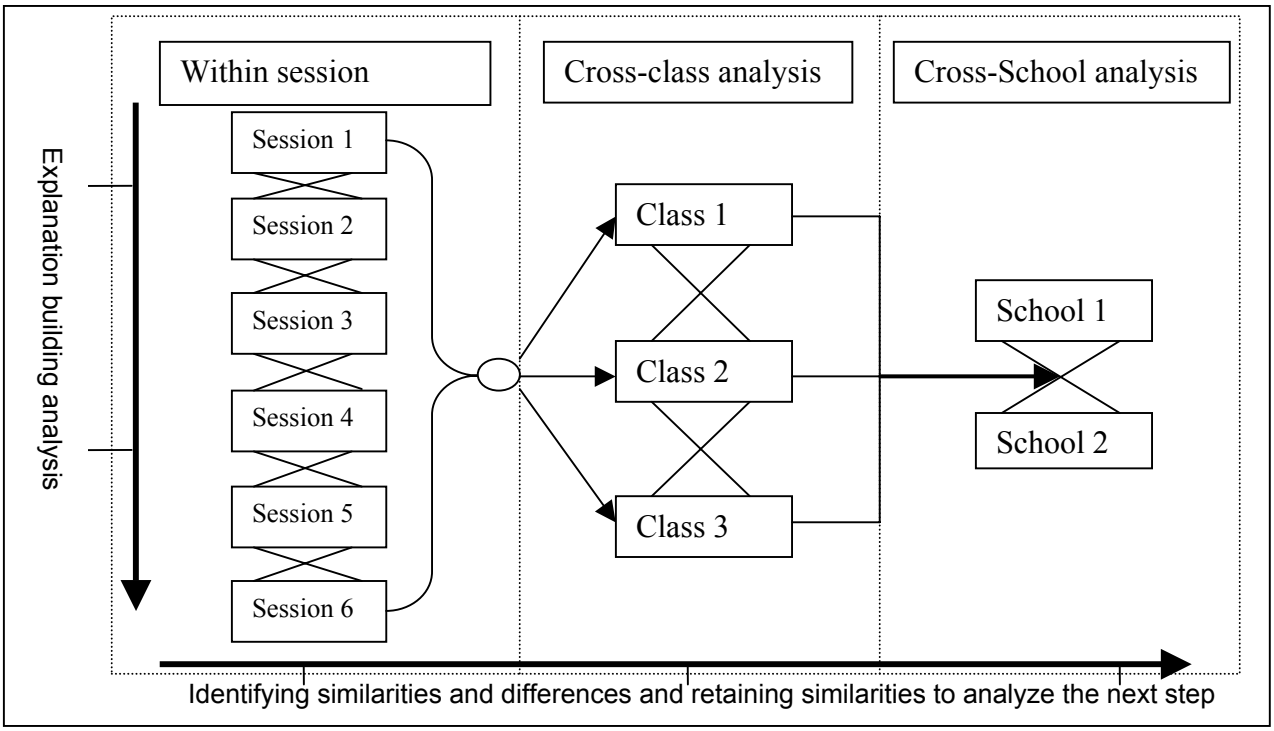


Figure 3: Data analysis scheme of the running stage

The second step of the analysis consisted of a cross-class search for patterns. Using Eisenhardt (1989) as a base, a methodology was developed to structure this type of analysis: A cross-class search for patterns was executed along the interaction, attitude and performance dimension. The classes were then iteratively compared to each other in order to identify similarities and differences among them, and to get insight on strengths and weaknesses of the pilot (see Figure 3 for an illustration of the cross-case analysis logic).

The third step of the analysis consists of a cross-school search for patterns that helped identify any other critical issues concerning the running of the pilot. Cross-school analysis was also done on the subject of the preparation- and introduction stage in order to identify comparable parties, their actions, their decisions and their steps.

To obtain even more meaning from the data, a fourth level of analysis was put in place: an "explanation building" analysis was performed. This mode of analysis consists of explaining a phenomenon by stipulating a set of possible causal links about it (Yin, 1994).[13] Yin suggests to begin such an analysis by taking the data collected from a first case to build a logical sequence of events explaining the case outcomes. The hypothesized set of events is then verified in a second case. If it is confirmed, the researcher proceeds with a third case, and so on and so forth. If at any point in the process the hypothesized explanation does not hold, an alternative explanation has to be developed and verified again until one holds with all the cases. The fourth level of analysis will be performed along the sessions dimension, the class dimension and the schools dimension.

[13] Yin, R. K. Case study research: design and methods (2nd ed). Thousand Oaks, CA: Sage, 1994.

After the fourth level of analysis, the 'explanation building analysis' a last data analysis step was put in place, the so-called 'post-relevance check'. The data that was not considered relevant in the first step was reviewed and re-checked for any missed critical issues, and to ensure no valuable data had gone to waste. The post relevance check was also used as a validation tool since it strengthened any theories, explanations and findings.

1.4 Organization of this report

WorLD program's History, achievements, approach and its partners will be portrayed in chapter two for those unfamiliar with the program. Tanzania will be described in chapter 3 including the education system and the current ICT situation. The quest for information about the average computer knowledge of the Tanzanian secondary student will be described hereafter in chapter 4 followed by the current teaching and learning methods. All of WorLD's program stakeholders will then be portrayed together with their opportunities and some possible negative aspects of the WorLD program. The Participating schools will then be introduced, followed by the teachers' participation interest, and computer knowledge. The computers knowledge of the participating students can also be found in this chapter. An explanation of the sessions of the WorLD pilot is then given, before describing the participants' attitudes during these sessions. Their computer learning skills are then analyzed and described in paragraph 4.3 together with an overview of the differences in teaching and learning methods and the participants' adaptation skills concerning this matter. The participants' opinions on the WorLD pilot can also be found in this chapter. Before concluding this chapter a description of the critical issues encountered during the running of the pilot. Recommendations and a conclusion can be found in chapter 5, the final chapter.

The research questions being discussed can always be found at the left hand side of the page.

2. THE WORLD PROGRAM

The World Links for Development (WorLD) program provides a variety of services in developing countries related to the use of the Internet and communication technologies in education and for community and youth development. WorLD provides sustainable solutions for mobilizing the equipment, training, educational resources and school-to-school, NGO and public- private sector partnerships required to bring students in developing countries online and into the global community.[14]

2.1 History

The World Links for Development program (WorLD) began in mid-1997 as a five-year pilot initiative of Mr. James D. Wolfensohn, President of the World Bank, to help bring the developing world into the information age through its future leaders — students — and to build cultural awareness among them in the face of an ever more global economy and society.

Uganda was the first pilot country for the WorLD program. The project began in 1996 with the School-to-School Initiative (STSI), focusing primarily on helping students develop basic computer skills (word processing, spreadsheets, etc.) and secondarily on communication via the Internet. Integrating ICT into teaching content was not the objective of this project. Under the pilot, three senior secondary schools in Kampala (about 930 students affected) received the hardware and software necessary for training (1-2 hours a week) and establishing connections. In 1998, the project expanded to 10 schools and trained 55 teachers and administrators. Attempts were made to engage in collaborative distance learning activities with U.S. schools, but none were fully realized.[15] From these humble beginnings as a pilot activity WorLD has expanded its teacher training and professional development activities to reach over 175,000 students and teachers in over 26 developing countries including: Botswana, Brazil, Burkina Faso, Cambodia, Chile, Colombia, Costa Rica, El Salvador, the Gambia, Ghana, India, Indonesia, Laos, Mauritania, Mozambique, Paraguay, Peru, Philippines, Senegal, South Africa, Sri Lanka, Turkey, Uganda, Vietnam, West Bank / Gaza and Zimbabwe.

To meet continued and growing demand from governments and communities all over the developing world beyond the pilot phase of the project, a separate non-profit, non-government organization (NGO) called "World Links" was spun-out of the World Bank Institute in 2000 to prepare and to carry out the mandate of the program once the pilot phase of the project ended in 2002. Working in coordination with the WorLD program in the World Bank Institute, all teachers training and professional activities of the **WorLD program** are handled by the **World Links** NGO (Non Governmental Organization).[16]

[14] For more information see http://www.worldbank.org/worldlinks/english/
[15] SRI International, Uganda country report, 1999-2000
[16] For more information http://www.world-links.org/english

2.2 Achievements

WorLD has been recognized as one of the most innovative and successful education programs assisting developing countries in bridging the "digital divide". The program was recently voted by the World Economic Forum's membership as the #1 educational program bridging the global digital divide, out of 75 programs evaluated, and was a finalist in the 2001 Stockholm Challenge, sponsored by the King of Sweden, as one of the world's most innovative information technology programs.[17]

An independent study assessment of the impact of the WorLD program done by SRI International[18] showed that a large majority of the teachers felt that working on computers in the WorLD program had an impact on a range of student skills, knowledge, and attitudes. Teachers also had positive assessments about the impact of computers on increasing students' general knowledge and information- reasoning and communication skills. Participation in the WorLD program had also resulted in the acquisition of new skills and attitudes in both technology and pedagogy.

Teachers reported that the Program had the greatest impact on their skills to design and prepare projects for students, learn more about their subject matter, and have students work in groups. The report also states that the World program improved teachers' attitudes about both technology and their own teaching. In addition, approximately half of all WorLD teachers felt that the Program had increased the amount of collaboration among teachers in their school on the design of projects for their students. Overall, the program had created new opportunities for developing countries to participate in and benefit from the global knowledge-based economy.

2.3 Approach

A country's participation begins with an invitation from its Ministry of Education. Within each country WorLD works with government, business, and local community groups to develop an implementation plan. Schools are then selected in accordance with various criteria, including: existing school and telecommunications infrastructure; opportunities for long-term self-sustainability, social and economic equity; the interest of the local communities; and the capacity to innovate. With the help of its partners, World starts by providing computers, linking classrooms to the Internet, working with local teachers to create localized learning programs, and fostering peer-to-peer collaboration projects. This strategy creates school-based computer centers that will evolve as a self-sufficient resource for the surrounding community.

2.4 WorLD partnerships

WorLD pursues strategic partnerships, both public and private, to bring the maximum level of technological and educational resources to teachers and students and the lowest cost. Two of the most important strategic partners are **Schools Online** and **iEARN**, the International Education & Resource Network, which together with **World Links** comprise the **Alliance for Global Learning.**[19] Within the alliance each of the partners fulfill a specific role:

[17] For more information http://www.challenge.stockholm.se
[18] SRI, Accomplishments and Challenges Monitoring and Evaluation Annual Report, 1999-2000
[19] For more information see http://www.global-learning.org/en/index.php3

Schools Online channels the entrepreneurial energy and engineering talent of the high-tech industry to develop solutions that meet the needs of schools in the developing world. World Links provides multi-year teacher development programs that support the integration of educational technology into the curriculum. I*EARN answers the question "Now what?" when a classroom has been brought online. The heart of the program is bringing students and teachers from around the world together through collaborative projects that make a meaningful difference in the world.

IEARN[20] (**I**nternational **E**ducation and **R**esource **N**etwork) is a non profit organization made up of over 4,000 schools in 92 countries, that empowers teachers and young people to work together online at very low cost through a global telecommunications network. IEARN's objective is for students to develop the habit of getting involved in community issues thus becoming better equipped for the future. Since1988, iEARN has pioneered on-line school linkage to enable students to engage in meaningful educational projects with peers around the corner and throughout the world. IEARN is:

- A safe and structured environment in which you can communicate
- A community of teachers and learners
- A known audience for writing and reading purposes
- An opportunity to apply knowledge in service-learning projects
- An inclusive and culturally diverse community

The projects enable students to develop:

- Research and critical thinking skills
- Experience with new technologies
- Cultural awareness
- The habit of getting involved in community issues.

Schools online [21]: Schools Online is a public benefit organization whose mission is to help students use the communication and information resources of the Internet for learning and cross-cultural dialogue. They accomplish this by providing appropriate technology and Internet access, developing locally-driven and sustainable Internet Learning Centers, facilitating teacher professional development, cultivating online cross-cultural projects, and sharing our knowledge and experience. Since 1996, over 5,700 under-served schools in the US and 392 schools in 32 other countries have received equipment and/or support necessary to get online.

World Links[22]: World Links is a sister organization of the WorLD program, it connects and trains teachers and kids in developing countries to improve education and employment opportunities. World Links offers a set of education technology-related services; these services range from basic school connectivity solutions to teacher professional development and training programs for both policy-makers and local communities interested in launching educational technology initiatives.[23] The five

[20] For more information http://www.iearn.org/
[21] For more information see http://www.schoolsonline.org/
[22] For more information see http://www.world-links.org/english/html/about.html
[23] World links folder, opening a world of learning… 2002

main services are connecting schools, teacher training, community learning centers, monitoring and evaluation and since recently, consulting.

Impacts of the WorLD Links:
- Improved student academic performance
- Increased teacher mastery of subject matter
- Enhanced information- reasoning and communication skills among students
- Development of essential technological skills demanded in the labor market
- Created new opportunities for developing countries to participate in and benefit from the global knowledge-based economy

3. THE RESEARCH FIELD SETTING

3.1 General Information about Tanzania

The United Republic of Tanzania is composed of Tanganyika and Zanzibar, which merged in 1964 shortly after independence. From the 1970s up to 1995, Tanzania was a one party state with an inward looking development strategy and socialist experiments for rural development, especially in the 1970s. Tanzania covers an area of 945,000 square km. The largest city and economic power hub is Dar es Salaam, although officially the government resides in Dodoma. Swahili is the national and official language. English as a second official language is widely spoken especially in major cities, to a lesser extend in rural areas. Arabic is spoken in Zanzibar and Pemba, to a lesser extent though. Tribal languages are widely spoken as well. The main religions are Christianity and Islam. Minority religions are Buddhism, Hinduism and traditional religions. The islands of Zanzibar and Pemba are predominantly Muslims (98%). Population in Tanzania is estimated at more than 36 million in 2001 with population growth still at 2.6 percent per year. Tanzania is one of the least urbanized countries in Africa. 75 to 80 percent of the population lives in rural areas. Tanzania is one of the poorest countries in the world with a per capita gross national income of US$ 280 (although estimates between $220 and $500 can be found). The economic growth rate has been around 5 percent during the last years. The main economic activity is agriculture, which still accounts for almost half of the GDP, but for 80% of the labor force and 85% of exports. Industry is underdeveloped with a share of only 15% of the GDP and 20% of the labor force. Currently there are two major development statements by the government. The first is the 1999 Tanzania Development Vision 2025. It sketches the way for Tanzania to become a middle-income country by 2025. To achieve this objective the document calls for high quality livelihood, good governance and the rule of law, and a strong and competitive economy. The second is the Poverty Reduction Strategy Paper, which comprises the national guidelines that direct government activities.

Figure 4: Map of Tanzania

The table below provides some facts about Tanzania related to international development, and compares them with similar facts about South Africa and The Netherlands [24].

Topic	Tanzania	South África	The Netherlands
Area (Thousands of km2):	945	1219	41.5
Population (millions):	36.0 (2001)	43 (2001)	15.864
Population under 5 (Thousands)	5974	7342	937
Population under 18 (thousands)	18258	16890	3455
Annual no. of births (thousands)	1379	899	179
Infant mortality rate (per 1,000 live births)	104	18.9	5
Under 5 mortality rate (per 1,000 live births)	165	63	5
Life expectancy at birth:	41 (1960), 52.3 (2001)	45.4 (2001)	78.3 (2001)
Population density (per km2):	38 (2001)	35 (2001)	466.45 (2001)
Gross national income (per capita):	US$280 (2000)	US$9400 (2001)	US$25,140 (2002)
Structure of GDP (%–2000):			
Agricultural	45	3	3.3
Industry	15	31	26.3
Services	40	66	70.4
Human development index (HDI) ranking:	140th of 162 countries (1999)	n.a	8th (1999)
Gender-related development index (GDI) ranking:	124th of 146 countries (1999)	3rd (1999)	n.a.
Adult literacy rate (%-1999):			
Total Men Women	75 84 66	n.a.	99 99 99
Population using improved drinking water sources (%-2000):			
Total Urban Rural	68 90 57	n.a.	100 100 100

Table 1: Facts about Tanzania

[24] UNICEF, The State of the World's Children, 2001
UNDP, Human Development Report, 2001
UNFPA, The State of World Population, 2001
CIA World Fact book, July 1, 2001

3.2 ICT development

Tanzania boarded on the development of ICT about five years ago. Initiatives to develop ICT were being carried out by individual, public and private entities making it difficult to optimize utilization of national insufficient resources. However, Tanzania did realize some achievements which created the need for more concerted efforts for the establishment and development of a fully fledged national ICT Policy that will be responsible for the coordination of all matters related to ICT in the country. In April 2002, the Government appointed the Ministry of Communications and Transport (MCT) as a National ICT Coordinator and a Focal Point for all ICT related issues. MCT presented its first order draft of the National ICT policy of Tanzania in may 2002. The ICT Policy is a reflection of national goals, objectives and aspirations as expressed in Vision 2025, setting out digital opportunities that Tanzania can exploit towards meeting the vision. The National ICT Policy spells out the priority goals and objectives that will integrate ICT in improving living standards and quality of life of Tanzanians, creating a more informed society, while leading to their wider participation in the Global Information Society. The time horizon of this policy is set at five years, with policy reviews carried out annually.

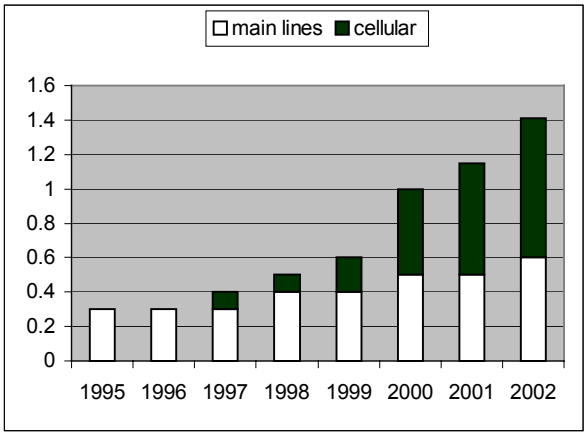


Chart 1: Telecommunications development Tanzania

Telephony- Currently there are 6 fixed telephone lines per 1000 people in the country and the number of mobile phone subscribers stands at 81 per 10,000 inhabitants[25] (see chart 1). In contrast, the City of Dar es Salaam has 5 fixed lines and 10 mobile phone subscribers per 100 people. At this time, there are two fixed phone line operators, and five Cellular phone networks in Tanzania: Celtel, Vodacom, Mobitel, TriTel and Zantel which is restricted to Zanzibar only.

Internet - The Tanzania Communications Commission (TCC) has licensed six companies to provide public data communication services including Internet bandwidth. However, there is no national Internet Exchange Point (IXP), which means that Tanzania's local traffic is routed via international routes (i.e. Norway and the United States). Therefore, the limited international Internet bandwidth is scarce and extremely expensive. There are presently sixteen licensed ISPs in Tanzania providing between 10,000 and 15,000 dial-up accounts in the country (80% Dar es Salaam) with many more users via Company and Government LANS and Internet cafés. Tanzania has the most internet café's of the sub Saharan countries, with estimates around 1000 Cafés, most of them located in Dar es Salaam.

[25] ITU (1998a): World Telecommunication Development Report 1998
National ICT policy of Tanzania, First order draft, May 2002

3.3 Tanzanian education system

Education in Tanzania is divided into primary and secondary systems, which together last for 13 years. Primary grades are called standards and secondary grades are called forms. The language of instruction in primary schools is Swahili; in secondary schools it is English. Primary education, which lasts for seven years, is free and compulsory. Students must write a national examination at the end of primary schooling. Many children leave school at this point and go to work.

Secondary school is not free; students must pay fees to attend. Secondary education is sub-divided into Ordinary Level (Forms 1 to 4) and Advanced Level (Forms 5 and 6). The Ordinary Level will last for four years while Advanced Level will last for two years. Students who complete Ordinary Level secondary education (they receive the Certificate of Secondary Education) can go on to the next stage of Advanced Level secondary education, vocational training, professional training or the labor market, while those who complete Advanced Level secondary education (they receive the Advanced Certificate of Secondary Education) join either tertiary and higher education and training institutions or join the labor market (see figure 5).

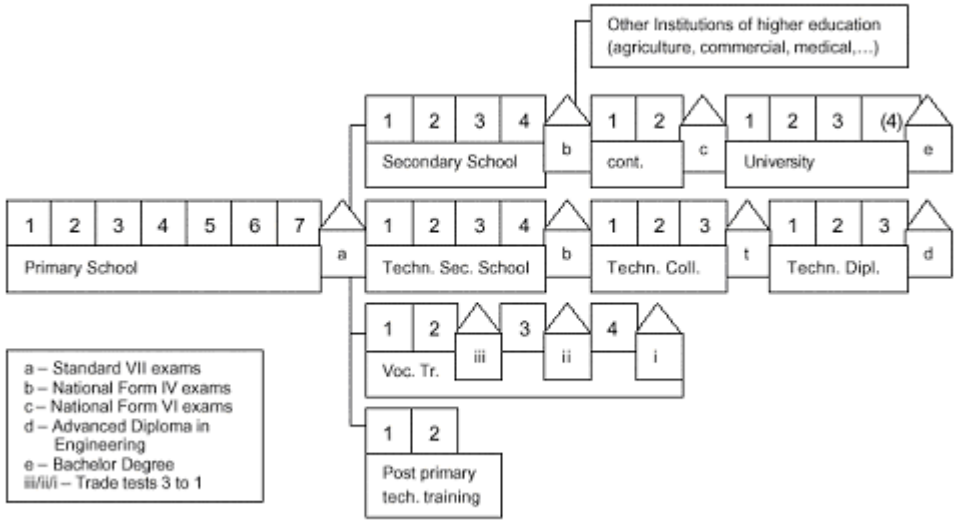


Figure 5: Educational structure in Tanzania[26]

Enrolment

There were 4.8 million primary school age children in 1990 and 6.1 million in 1996 and the number of children enrolled in primary school in 1996 constituted 66% of the total number of primary school aged children. This is a decline of roughly 4% since 1990. For both years the percentage of school age boys and girls enrolled is roughly the same. However, as these are the gross enrollment figures, the number of people enrolled includes those above primary school age, and therefore there are actually more than 34% of primary school aged children out of school. The actual amount of primary school age children enrolled in primary school is 48%. 96% of the children enrolled in 1995 reached Grade 2, and 81% reached grade 5[27].

[26] VET in Tanzania – The reform experiences 1990 – 1999, p 9
[27] Source UNESCO World Education Report 2000

The number of children enrolled in secondary school in 1996 constituted 6% of the total number of secondary school aged children. There were 3.3 million secondary school age children in 1990 and 4 million in 1996, and the figures show that 6% of boys, and 5% of girls were enrolled. Just 0.057% of the population is enrolled in tertiary education.

Figures for 2001 show the official student: teacher ratio to be 1:36 in primary schools and 1:17 in secondary schools. Teachers make up 4.4% of the non-agricultural labor force. 44% of primary teachers and 26% of secondary teachers are women.[28]

3.4 Tanzania's ICT obstacles in Education

From the first order draft of the 'National ICT policy of Tanzania[29]' we can derive the following major problems concerning ICT in the educational institutions in Tanzania:

- There is a major computer shortage in Tanzanian educational institutions. Currently very few pre-college facilities (Primary and Secondary Schools and Teacher's Training Colleges) have computer laboratories. If computers at all present, they are likely to be of very poor quality or in deteriorating state and very few of them are not likely to be connected to the Internet. If connected, Internet access bandwidth is limited ranging from 32 kbps to 512 kbps.

- There is a major shortage of computer training programs. There is an official Secondary School Computer Studies Syllabus for Forms I – IV. However, it is obsolete since it was developed in 1996 and issued in 1997 and only very few students have taken these courses so far. Furthermore most opportunities for training are limited to urban centers.

- Coverage of the network infrastructure is still limited to urban areas and thus lack of the telecommunications infrastructure in the rural areas remains a basic impediment to the provision of implementing ICT in secondary education.

[28] National ICT Policy of Tanzania, First order draft, May 2002

4. THE 'WORLD PILOT' TANZANIA

4.1 Preparation stage

In order to bridge the discrepancy between expectations and reality to suit the preparation needs of the WorLD pilot, the computer literacy of the Tanzanian Secondary student was assessed. Hereafter, the Tanzanian teaching and learning process of the secondary schools was explored. The results are described in the paragraphs below.

4.1.1 Computer literacy

"What is the overall computer literacy of the Tanzanian secondary student?"

The main problem encountered during the preparation stage was getting to know the computer literacy level of the average Tanzanian Secondary School student in order to start developing a computer course as part of the WorLD Pilot. Before developing such a program one must know where to start and at what speed to teach. Due to the limited time span, it was necessary to get a head start in developing such a program.

Information on this issue was scarce, one document was found stating that 2% of all schools in Tanzania have PC's on site[30]. To ensure this, 30 former Secondary School students (now studying at the UDSM) were interviewed as well as two employees from the Department of Computer Science that conducted computer classes at an academic level. The students were asked how much computer knowledge they acquired during their Secondary School years and if any, where they had obtained this knowledge. The teachers were asked about their experiences with teaching newly arrived students computer classes.

Interviewing the teachers was quite interesting since they were able to draw an accurate picture of what their classes looked like:

Mr. Ntelya teachers at CSD said: "Most students in my class knew nothing about computers at the start of the course. The first couple of lessons were a mess; from students moving the mouse in the air, to students staring at the monitor the entire period. Some students are not suitable for working with computers at all. They just won't touch the keyboard or the mouse. The one that are suitable learn quickly once they master the basics".

A recent study done by Mr. I. Nnafie on Internet cafés in Dar es Salaam showed that out of 346 Internet users 7.3% of the users were primary school students and 55.5% secondary school students out of which 30.2% O-level and 20.3% A-level students.

Mr. Hashim teacher at CSD said that: "Some students are even afraid to touch the computer, they heard it is a very expensive piece of equipment and are scared of doing something incorrect and ending up paying for it. You have to start by teaching them that the computer is unbreakable".

The students interviewed confirmed the teacher's outcomes; it became clear that only 6 out of 30 students interviewed had some computer experience. 5 of those 6 students came from an urban area and 2 of them had experienced the Internet before coming to the UDSM. The computer experience was obtained at school on mostly donated computers, the Internet experience at Internet café's. Bearing in mind the fact that only 0.057% of the Tanzanian population is enrolled in tertiary education (see research field setting), the students

[30] SADC e-Readiness Task Force. 2002. SADC e-Readiness Review and Strategy - Recommendations of the SADC e-Readiness Task Force

interviewed were privileged. Considering the above, it was safe to assume that most secondary students participating in the WorLD pilot would have no- to very little computer experience.

4.1.2 Secondary education method

"What is the current education and teaching process of the Tanzanian secondary Schools?"

Whilst sitting in the back of a couple of classes at St Matthew's Secondary School, interesting observations were made concerning their teaching and learning methods. The class structure consisted of a teacher lecturing and students not contributing a great deal. The classes counted between 30 and 40 students, and although the teaching language was English (signs were seen al over school premises saying; "English Only") the teachers occasionally jumped to their native language –Swahili- for a quick explanation. Most students had a cahier in which they copied facts written on the chalkboard by the teacher. The teacher was not using any reference material, he had clearly been teaching the same thing for many years. Occasionally he would ask a rhetorical question to keep the students attention: "Wind and water are the main agents of soil erosion. What are the main agents of soil erosion?" the students then repeated after him "wind and water". The students were not given much opportunity to raise a point in class, and very seldom were they asked if they understood the topics. The students were absorbing, rather than reflecting.

If the class observations made at StMatthew's Secondary School are compared with the observation Makau[31] made at six Kenyan schools, the following learning and teaching processes are identifiable:

1. *In most lessons the approach was didactic and teacher-centered.*
2. *Most lessons were focused on providing facts, and very little on "learning how to learn".*
3. *In the majority of the lessons, there was little peer learning.*
4. *Virtually no teaching aids, except from the blackboard or textbook, were ever used.*
5. *The most common teaching strategies were lectures accompanied by note giving, question and answer sessions, demonstrations and explanations by the teacher.*
6. *Many teachers did not set a high premium on evaluating the learning-taking place during their lessons. There were few instances of homework being given.*
7. *In most subjects the content was approached in a manner, which isolated the skills and knowledge from real life. There was little drawing on the experience and environment of the students.*
8. *In the majority of lessons students sat totally passively throughout the lesson receiving the "words of wisdom" from the teacher.*
9. *There were very few instances of teachers using a sequenced problem-solving approach to the learning of new concepts or attributes. Students were rarely asked to give their views or to challenge a problem.*
10. *Efficient use of the time available to the teacher was rare.*

[31] B.M. Makau, **Computers in Kenya's secondary Schools, Case study of an innovation in education**, 1990

4.1.3 conclusions and implications

During the preparation stage the following became clear:

1. The students that where going to participate would probable have very little to no experience with computers and the Internet. Worst-case scenario being, that most participants would not even dare to touch the computer.
2. The students and teachers would have to adapt to an entire different teaching and learning style.

The implications of these findings for the next two stages were as follows:

1. The education material had to be suitable for those not familiar with computers at all.
2. The education material would have to slowly address the educational difference.
3. The students and teachers to be chosen had to show some initiative, and not be frightened by a computer.

4.2 Introduction stage

This paragraph introduces the main stakeholders and the participating schools. An overview of the teaching topics is also given after having identified the participation interest of the schools and teachers.

4.2.1 WorLD Program stakeholders and opportunities

The main stakeholders identified by document analysis involved in the WorLD program are listed in table 2, as well as their identified concerns, actions and their opportunities. The opportunities are hereafter discussed in greater detail for the Tanzanian government and the secondary schools.

"Who are involved in the implementation of the WorLD program? What are their concerns, actions and opportunities?"

Stakeholder	Concerns	Actions/commitments	Opportunities
Tanzanian government	Reduce poverty and securing high quality livelihood, good governance and the rule of law, and a strong and competitive economy	-Regulate ICT policy -Increase investment in education sector -Fight corruption	-Economic growth -Reduction of aid dependency -HIV/AIDS and malaria reduction -Own capacity to master and adapt global technologies to local needs
Ministry of education and culture	Create equity; improve quality, access to, cost-effectiveness and internal efficiency in primary-, secondary- and tertiary education.	-Regulate education policy -Increase role of private sector -Identify suitable schools	-Improvement of education sector -Active role in rapid technical changes -Increase of Swahili websites -Bigger base for a national IXP
World Bank	Provide Tanzania onto a path of stable, sustainable, and equitable growth	-Coordinate efforts - Manage loans and credits - Finance projects	- Continuity in development assistance
WorLD Links	Integrate information technology into the classroom, expand distance-learning opportunities, enhance cultural understanding across nations, and build broad support for economic and social development.	-Provide computers -Provide connection -Provide computer trainers -Provide technical support -Fostering peer-to-peer collaboration projects - Create localized learning programs	-Expansion of WorLD online-community -Continuity
Secondary Schools - Teachers - Students	Provide/receive proper education -Good teaching environment -Be prepared for future	-Change teaching and learning methods - Change teaching curriculum - Reeducate teachers - Endeavor cultural change 'Americanization'	-Acquire computer skills -Increase of teaching/learning resources -No longer isolated -Increase in learning and teaching motivation -Collaboration increase between schools/teachers/students -Increase in information- reasoning and communication skills
Local communities	Create a healthy living environment	Endeavor cultural change 'Americanization'	-School-based computer centers -Benefit from the global knowledge-based economy - Increase computer literacy
Donors/Investors	Create a healthy living environment	- Donate money, services, goods	- Increase of PR - Feel good factor

Table 2: stakeholders, concerns, actions and opportunities overview

"What are possible opportunities of the WorLD pilot?"

Opportunities: Tanzanian government

Introducing computers and Internet in Tanzania can start **a cycle of sustainable development** within Tanzania (see figure 6). The WorLD program can therefore provide Tanzania with a variety of opportunities that will not only support development within the education sector; it has potential to eventually drastically improve the Tanzanian living standard. Implementing the WorLD program means **investing in secondary education** as well as **investing in integration of ICT into the community**. Note however that these opportunities are mostly created because of the introduction of computers and Internet in Secondary education in Tanzania. It does not necessarily have to be the WorLD program.

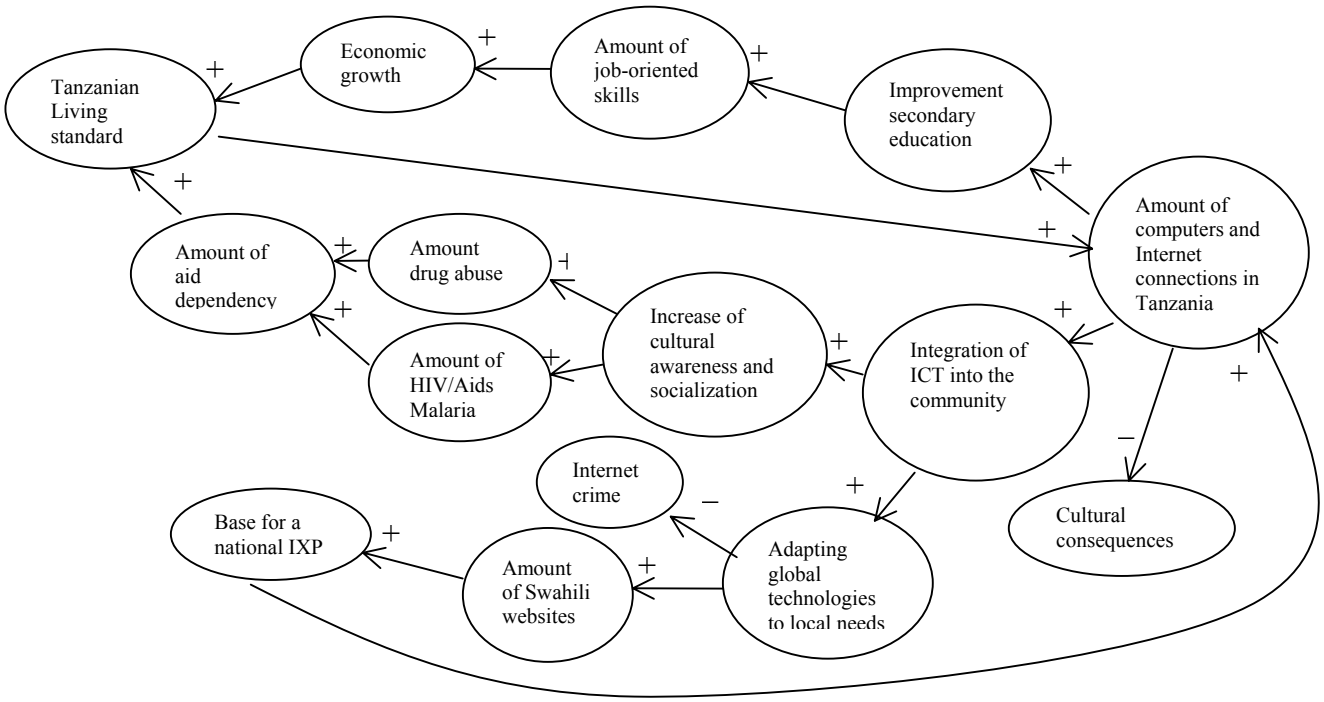


Figure 6: cycle of sustainable development causality diagram

Investing in education

One of the main reasons for investing in secondary education in Sub-Saharan Africa is because of its crucial role in economic growth[32]. Secondary education provides countries with critical higher-level skills and knowledge needed for economic growth, including further learning and training of professionals such as technicians, scientists, and entrepreneurs. Secondly, secondary education plays a crucial role in the socialization of young people and in targeting youth-at-risk[33]. The age group in secondary education demonstrates the greatest capacity to change behavior. Secondary education plays a decisive role in fostering positive social attitudes, civic values, and in fighting against drug abuse and diseases like HIV/AIDS and malaria. Another major reason for investing in secondary education is because of the considerable private returns[34]. It provides the opportunity to

[32] Fouché, Ben. "*Towards the Development of an Equitable African Information Society*." African Development Review 10 (June/July). 1998.

[33] UNAIDS. 2000. *HIV/AIDS and the Education Sector*. Programme Coordinating Board. 11 April 2000, Geneva

[34] Lewin, Keith and Francoise Caillods. *Financing Secondary Education in Developing Countries: Strategies for Sustainable Growth*. UNESCO/IIEP, 2001Paris

acquire attitudes, skills, and competencies that are unlikely to be developed over the primary grades. These skills enable youth to develop job-oriented skills, participate fully in their society, take control of their own lives, and continue learning. A fourth reason is the rapidly increasing demand for secondary education, a growing number of primary graduates in Sub-Saharan Africa wish to continue to secondary schools[35]. Investing means creating more learning spaces.

Investing in integration of ICT into the community

Besides the opportunities created by investing in education, the integration of computers and the Internet in the secondary education curriculum, create opportunities to cope with the increasing importance of ICT in the 21st century. Secondary schools provide an excellent inlet for the introduction of computers and Internet into the Tanzanian community. The WorLD program targets secondary schools, therefore providing an opportunity for Tanzania to build an own capacity to master and adapt global technologies to local needs. By allowing the ICT's to grow with the oncoming generation, the computer and Internet will be given room to develop and adapt within Tanzania's culture. Once the first WorLD pilot Secondary students graduate and grow old, a solid computer literacy base will be starting to develop within Tanzania, allowing the society to actively take part in the globalization and the rapid technological changes. An increase of Swahili websites and a base for a national IXP can be created. By targeting urban schools, the WorLD program can also provide the chances towards acceleration in urbanization and a greater regional integration**.** Proper education will no longer be school oriented, students form rural areas can move towards urban areas with the same or better education then urban students. An increase of computer literacy disseminated throughout the nation means providing everyone with the same opportunities. Continuing the WorLD program for a longer period of time can eventually lead towards a domestic structural change and a reduction of aid dependency. E.g. talking about HIV/Aids in Tanzania is a taboo, resulting in a poor informed society and a high infection rate. The Internet can be used as a silent information source, making it possible to break the taboo amongst newer generations.

Opportunities: schools

The opportunities arising for the Secondary Schools when implementing the WorLD program are realizable on shorter term, and function as the 'cradle' for the Tanzanian government opportunities as described above. With the introduction of computers and Internet, the students and teachers will be provided with an inexhaustible source of up to date teaching materials, including online courses, making the material shortage irrelevant for that particular school. Motivated students can then speed up their path trough self-learning; they are given the chance to exploit their interest and curiosities using the Internet. Students will become less 'teacher dependable' when in need of information, laying the future prospects of a student in his own hands. Both teachers and students will be taken out of isolation and given the chance to explore and learn about other cultures. Physical and geographical barriers can be overcome and communication facilitated, ICT's have the potential to eliminate the artificial boundaries between schools and the outside world, and promote an environment that emphasizes collaboration rather than competition. The myriad of Websites can help teachers develop or improve lesson plans, exchange ideas, obtain information, and find free animations and simulations to enliven their lessons. Learning time will no longer equal classroom time; computers and the Internet can be used for projects, motivating the students to be more involved in the learning process. The introduction of computers and Internet can

[35] ADEA.*What works and what's new in Education: Africa speaks*. 2001 Paris

also revive the teaching profession, shifting the core descriptions from hard-, monotonous- and futureless- work, towards a promising, challenging and dynamic environment. Managing it well, schools connected to the internet can claim their 'existence' and use it for e.g. creating fund raising opportunities by creating a website.

"What are possible negative aspects of the WorLD program?"

Possible negative aspects of the WorLD program

As shown in table 2, the WorLD program involves many stakeholders, with different concerns. Looking closely we can detect some aspects that might create tension between certain stakeholders, uncovering some negative characteristic behind the WorLD program.

- The Ministry of education strives at equity of education throughout the nation. The WorLD pilot does the exact opposite; it creates an educational gap. It implements their program in few schools only, favoring few students only.
- The Tanzanian government is poor, and although the program might contribute to 'economical growth', there are more possibilities to achieve this. The WorLD program is expensive.
- The WorLD program has been implemented in many 'developing countries' while it is an American formula. This leaves little room for personalizing the program and can be seen as the 'McDonalds' of the ICT introduction Programs. Oddly enough, there is no McDonalds in Tanzania, but plenty of Tanzanian equivalents!
- The WorLD program involves many educational steps to take for students and teachers that are somehow preset, leaving little capacity for them to build an own capacity to master and adapt global technologies to local needs.

There are approximately 520 million Internet users. 4.1 million are in Africa. 80% of the language on the Internet is English, but only 10% of the world speaks English.

Other then the specific world program's negative aspects, introducing ICT in the education sector has a few other negative aspects:

- ICT implies drastic cultural consequences, promoting American English language, culture and monopolized software packages, endangering cultural and linguistic diversity with a new form of what was once labeled cultural imperialism.
- Although the Internet functions as an immense online library of information, it is also an info inferno. The information has to be selected, refined, digested and understood in order to become useful information and to be transformed into knowledge. Students might be 'negatively influenced' when confronted with inappropriate information found on the Internet.
- ICT technologies also imply new forms of crime. The Internet could provide desperate people with the mean of activating schemes. E.g. the Internet could be used for sending mails, luring wealthy people to developing countries with the wrong intentions (see appendix K for an e-mail example).

4.2.2 The Two 'WorLD pilot' Schools

The two schools selected during the end of the preparation stage to participate in the WorLD pilot were, Janguani Secondary School and St Matthew's Secondary School. These schools were approached by an employee of the CSD, Mr. Kyaruzi, who was familiar with many schools in and around Dar es Salaam.

Janguani Secondary School is a girl only school situated in an urban area in Dar es Salaam. It has approximately 1500 students. It had a computer room with 6 computers in deteriorating state that are not connected (see table 3 for further detail)

Figure 7: Computer room StMatthew's Secondary School

St Matthew's Secondary School is a mixed boarding school, situated in a more remote area, about 1 hour drive south of Dar es Salaam. It too has a computer room with 7 old 386-Hertz computers of which 3 are not working (figure 7). These computers were rarely used due to the simple fact that nobody knew how to integrate them into the school's curriculum and that were old-fashioned.

School information	Janguani Secondary school	St Matthews Secondary School
Computer class	*Yes*	***Yes***
Nr computers	*6*	*7 (4 not working)*
Internet connection	*No*	*No*
Situated	*Urban (Dar)*	*Rural (1 hour south of Dar)*
Enrolment	*Approximately 1500*	*Approximately 1200*

Table 3: Information on schools

Class 1 consisted out of 30 girls and 5 teachers from Janguani Secondary School. Class 2 consisted out of 15 boys and 15 girls and 5 teachers from StMatthew's Secondary School. Class 3 out of 21 boys from and 4 teachers from StMatthew's Secondary school (see table 4 for further details).

Class Information	Class 1	Class 2	Class 3
School	Janguani	StMatthew's	StMatthew's
Nr students	*30*	*30*	*21*
Nr teachers	*5*	*5*	*4*
Form	*5 and 6 A- level*	*2 O- level*	*2 O-level*
Male/female	*All female*	*15/15*	*All Male*
Nr computer illiterate	*12*	*29*	*20*
Nr having e-mail account	*18 (use internet café)*	*1 (uses internet café)*	*1*
Average age	19.47	*15.2.*	*15.6*

Table 4: information on the 3 classes

4.2.3 Participation interest

In order to assess the computer and Internet awareness and the actual need of a program such as the WorLD program, the school headmasters and participating teachers were asked about their reasons for participation. The following paragraph states the findings.

"What is the participation interest of the schools?"

Head of schools:

The headmaster/headmistress of the participating schools fully realized the importance of computers in the developed world, and were very happy to cooperate with the research. The fact that they had to provide the transportation to and from the CSD for their participants created no barrier (see figure 8). For StMatthew's Secondary School, this meant a total of two and a half hour drive per session (back and forth). Only one restriction was appointed; the World pilot was not to interfere with the regular school activities.

Figure 8: StMatthew's transportation to CSD

Although both headmasters were very happy to be part of the pilot, the headmaster from StMatthew's Secondary School showed extreme enthusiasm. He was very thankful this opportunity was given to his school, to his students and teachers. During a tour on the school premises with the headmaster it became clear why he was thankful for this opportunity. The school is spaciously built in an extraordinary silent surrounding on the edge of a green valley. "We just recently had a telephone line installed, that is the only connection with civilization" the headmaster said while standing on the edge of this valley, "a valley full of venomous snakes and malaria bearing mosquitoes" he continued. It became clear that StMatthew's has very little opportunity to expose itself to computers and the Internet because of its rural location. Therefore the headmaster favored conducting the pilot with students from form 4 or below, so that the computer knowledge would stay in school for a while. This way the knowledge could be passed on to other students.

"What is the participation interest of the teachers?"

Teachers

The participating teachers were well aware of the existence of computers and the Internet. Most of them had never worked with a computer or surfed the Internet their selves, but heard about it from those that had. They were made very curious, and realized that it could provide opportunities for them and the students, education wise or other wise, and were very interested in finally experiencing it themselves. As one teacher of StMatthew's Secondary School put it: "One has to keep pace with development and new technology, if one has lagged behind a bit one is bound to be an island of its own and this is proving detrimental to my (our) development in many ways e.g. acquiring new knowledge, communication and exposure". The main reasons the teacher decided to participate in the WorLD pilot were:

"I think it will make students be ready to learn new concepts and realize their loopholes for they will automatically compare themselves with others. They will learn that if one doesn't walk a lot (stagnant) you may be tempted to think that your mom is the best cook, which is misconceived" Teacher StMatthew's Secondary School

- To learn the computer basics
- To become familiar with the Internet
- To check if computers can be useful in their environment
- To keep pace with technology development
- To become more familiar with this era of science and technology
- To get connected with the rest of the world

The teachers were well aware of what the computer and the Internet could mean for the Tanzanian education, some quotes:

- *"The students could develop interest in all subjects"*
- *"Reduce learning and teaching tasks"*
- *"Replacing the traditional way of copying notes from the chalkboard"*
- *"Students will be globally connected and face so many challenges herby exciting them to work hard"*
- *"To get the information necessary for learning and get more detailed information, which can be obtained effectively"*
- *"Learning and getting information you want in the place you are"*
- *"Learn about other cultures"*
- *"...See what others are doing in their part of the world"*

"Students used to depend on teachers for more then 95 %, but with the knowledge of internet a student can explore more and more of what they have learned in class" Teacher Janguani Second

4.2.4 Computer knowledge of participants

Students

In class 1 there were 18 students that had some computer experience. In class 2 and 3 there was only 1 in each class. This experience however limited itself in most cases on how to receive and send e-mail at yahoo.com using the Internet Explorer. Friends had shown them the way to the Internet café's and taught them how to e-mail. A combination of factors explains the computer-literate 'student' difference between the classes:

a) The students from class 1 were from an Urban Secondary school, as to where class 2 and 3 were from a rural situated school. The amount of Internet café's is significantly higher in urban areas.
b) Classes 2 and 3 were from a boarding school as to where class 1 was not. Students from class 1 went home everyday and in the weekends creating more opportunities to meet friends and family and going to Internet café's. Students from class 2 and 3 where limited to the friends and facility's at and around school.
c) Students from class 1 were considerably older then those from classes 2 and 3, the average age respectively being 19.47, 15.2 and 15.7.

Conversely, there was a girl from class 1 that was remarkably better with computers than the rest. Apparently she worked at a radio station in Dar es Salaam, were she worked with computers and the Internet.

Internet Café

The Internet café plays an important role in the Tanzanian society. There where Internet cafés in developed countries serve mostly to meet the needs of tourists, in Tanzania it serves the population, including students. Only those students that have found the way to the Internet café have some experience, since most schools do not have decent working computers or an Internet connection. Even tough the Internet café's are relatively cheap (500

shillings an hour, equivalent to approx. 0.50 $) most students cannot afford if, and even if they can they need someone that is able to introduce them to the Internet. Someone needs to take them there.

"Most students have never touched a computer, they have just seen one buy peeking trough a window" teacher StMatthew's Secondary School

Teachers
Out of 14 teachers four said to have some computer experience. They had learned this at the UDSM. Only one of these teachers had an e-mail account, but doubted if it still worked. He had forgotten how to access it. Three of the four teachers fulfilled the role as "Computer Science teacher" at their school. Their experience was limited to the operating systems DOS and the early versions of windows, and none of them had recently worked with a computer. The remaining 10 teachers had no computer experience whatsoever.

4.2.5 Description of Sessions

The 'World pilot' sessions were given in a computer lab containing 18 Pentium III computers connected to the Internet, running Windows NT. A beamer was used for the presentation of the education material (see figure 9). The computer participant ratio was two participants to one computer. Due to a limited time span, the participants were taught the true basics of computers and the Internet:

Session 1: Introduction to the computer
(See appendix D for the used sheets)

Hardware: Input devices: *Keyboard, mouse*
Output devices: *Printer, Monitor*
Software: Operating system: *Windows NT*
Computer applications: *MSWord, PowerPoint*

Session 2: Introduction to the Internet
(See appendix E for the used sheets)
Physical structure of the Internet: Computer Network, WWW, Routers, IP address
Using The Internet: History, opportunities, Applications, Internet explorer, Browser components, URL's, Search engines: www.Google.com, www.yahoo.com

Session 3: The GEO game[36]
(See Appendix H for the used sheets, and appendix J and I for the handout examples)
The Geo game is a geography game where the participants had to match a description of each location in the game with the name of the corresponding city using 10 given clues (e.g. latitude, time zones, landforms, points of interest, tourist attractions, state capitals). The game was originally designed for regular classroom activity using maps, atlases, and other reference materials. The game however, was slightly altered for the pilot, so that the Internet could be used as a reference. The main purpose of the game was to increase the awareness of geographical and cultural diversity, to learn geography terms, to get more familiarized with the computer and its applications, to learn how to use search engines and to stimulate cooperative learning. The outcome was checked on the Internet, and the students were put on a winners list posted on the Internet.

[36] For more information: http://www.gsn.org/project/gg/index.cfm

Session 4: E-mail

(See appendix F for the used sheets, and appendix G for the used student manual)

What is electronic mail? Creating email account at **www.yahoo.com**, writing and sending e-mails.

Session 5: Connecting with the world

No sheets were used during this session, instead was the beamer used for the demonstration of how to set up a chat session. The students followed the steps. During the session, the following questions were discussed and/or demonstrated:

How do you connect with others? What is chatting? How do you chat? Chatting procedures, setting up chat session, chatting.

Figure 9: students behind beamer

Session 6: Internet and education

This session was used to give students the opportunity to open an e-mail account or to set up a chat session if they had failed to do so during previous sessions. The other students were given the chance to explore the Internet for education purposes, such as tutorials and quizzes.

E-learning: *Tutorial on the Internet e.g. www.vts.rdn.ac.uk/tutorial/education*
Learning to learn: *finding resources, using resources*

4.2.6 conclusions and implications

During the Introduction stage the following became clear:

1. The computer experience of the two chosen schools were not alike. The school situated in the urban area had more computer-exposed students than the school in the rural area.
2. The students of the urban school had more computer experience than the teachers, because of Internet café's.
3. The school with the lesser amount of computer experienced teachers and students showed the most interest.
4. The awareness of the importance of computers and the Internet into the Tanzanian secondary education was strongly present at both schools.

The implications of these findings for the next stage where as follows:

1. Since the computer literacy level was practically the same, the teachers and students would be treated no different, and get the same computer education.
2. Although the computer experience level differed per school, the same educational material would be used, with the option of altering the teaching speed.
3. Since computer and Internet awareness was present, the interest of the students and the teachers would play a great role in developing/altering the education material and topics.

4.3 Running stage

The analysis showed that there was a significant gap between the first session and the last session of the pilot considering class attitudes and computer comprehension per class that participated in the WorLD pilot. This next chapter deals with the following questions:

4.3.1 within session analysis: Class attitudes

"What is the participants class attitude?"

The students in all classes were significantly good listeners; they paid a lot of attention to what was said. They were very eager to learn about computers and did exactly as they were told. Especially the students from class 2 and 3 were very disciplined. They showed a great deal of respect and they did not speak while they were spoken to. All participants clearly realized the 'WorLD pilot' was an exceptional opportunity to be familiarized with computers and the Internet. Table 5 shows the main characteristics of the sessions concerning attitudes per class, and how these were apparent.

Characteristic	Observation	Class 1	Class 2	Class 3
Discipline	Paying attention Listening to instructor Patience	►►►► ►►►► ►►►	►►►►► ►►►►► ►►►►	►►►►► ►►►►► ►►►►
Respect	Polite Doing as they are told Not speaking when spoken to	►►►► ►►►► ►►►►	►►►►► ►►►► ►►►►►	►►►►► ►►►► ►►►►
Motivation to learn	Observing a lot Wanting to 'do good' Always eager to start	►►►► ►►►► ►►►►	►►►►► ►►►► ►►►►►	►►►►► ►►►►► ►►►►
Thankful	Showing gratitude	►►►►►	►►►►►	►►►►►
Little feedback	Hesitation to speak up in class Afraid to ask 'silly' questions	►►►►► ►►►►►	►►►►► ►►►►	►►►►► ►►►►
Little interaction	Individual minded Little collaboration	►►►►► ►►►►	►►►► ►►►►	►►► ►►►►

Table 5: main class characteristics

"What is the quality and quantity of interaction with other participants and with the instructor?"

The students of all three classes were very individual minded during the first couple of sessions; there was very little interaction between the participants. The interaction amongst students was very low in all classes. Interaction between teachers and students took place in class 2 and 3, but none in class 1. In contrast, there was very little interaction between the teachers from class 2 and 3, and a lot between the teachers from class 1. The way of interaction can best be explained due to the computer knowledge of the teachers versus that of the students. In class 1 the teacher could no longer presume a teacher role, since there were 18 students with more computer knowledge. The teachers therefore acted more as students. In class 2 and 3, the teachers had just a little more experience because they had requested private lessons two days before the sessions started, this in order to be prepared and to be able to assist the students.

As the sessions progressed, there was a noticeable shift in interaction. Due to the hands on exercises and the Geo- Game the students started to collaborate with each other. In addition, two students behind one computer also motivated the students to form closer relationships with one another in working together. Teachers started interacting more with the students

once they became aware of how the technology could be integrated into teaching, the Geo-game made this particularly clear.

Figure 10: Janguani Secondary students in computer lab

Getting feedback from the students was not easy in the beginning. It was difficult knowing if the students understood what was just explained. Students hesitated to ask questions in class. According to the teachers the students were afraid to ask a 'silly' question in front of the class. When asking if they understood 'Yes sir' would always be the answer, saying no is considered to be very rude in Tanzania. Instead of oral feedback, the feedback was obtained looking at body language; especially the glazy eyes were very helpful. Once the students started to get used to the instructor, they were a lot less reluctant in asking questions. These questions however were always asked privately and never 'in class'.

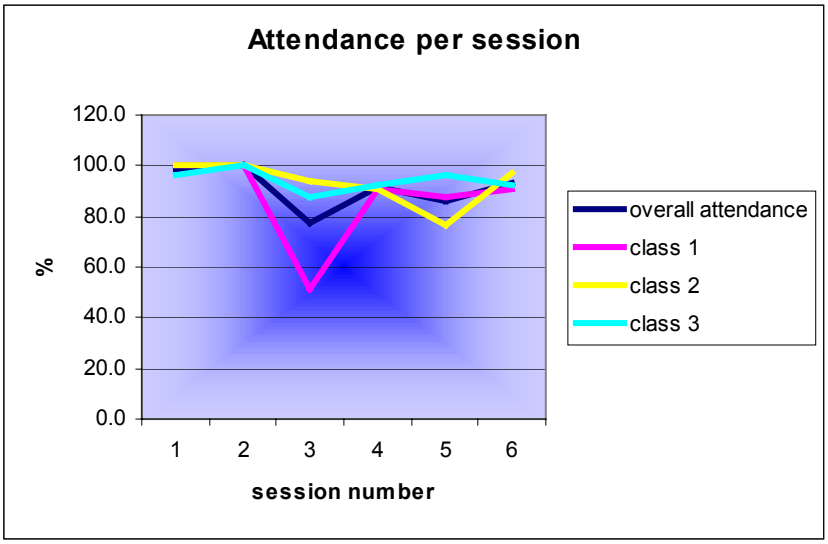


Chart 2: Attendance of the WorLD pilot

The attendance per session per class is shown in chart 2. The graph shows how only 50 percent of the participants attended during the third session. This was due to the fact that it was the celebration of the birthday of the prophet Mohammed (Eid al-Moulid). This is an Islamic holiday; the exact date depends on the moon and is known for certain only a view days in advance. It was therefore hard scheduling the right date in advance. Other then the ad hoc emerging holiday, the attendance was considerably good. The main reason for students not attending was because of illness (malaria was often the case). Death of a close relative (mother) occurred twice. The main reason for teachers not attending was because of "other duties at school".

4.3.2 cross session analysis: Computer and Internet comprehension

"What are the participant's difficulties when working with computers and the Internet?"

The comprehension difficulty level of the computer basics seemed to be rather low for al participants (see table 6). The participants had no major problems with the computer basics; the 'computer feeling' grew at a tremendous rate during the first couple of sessions and logically slowed down during the rest of the sessions when most basic things were mastered. Overall it can be said that the students had more 'computer feeling' then the teachers, especially the boys. During the first sessions it was noticeable how students learned by closely observing the instructor, while the teachers preferred exploring the 'tricks' themselves. Participants that had some computer experience had a minor advantage in the sense of not having to create a 'computer feeling' from scratch. None of the participants were afraid of working with the computers, and none started moving the mouse in plain air as was suggested by some experts. Some small practical (rather humorous) actions were observed in the beginning, like not knowing what to do when the mouse hit the end of the table, while the cursor had not reached the end of the screen.

	(Comprehension) difficulty level		
Topic	Class 1	Class 2	Class 3
Computer basics	Low	Low	Low
Windows OS	Low	Medium	Low
MSWord	Low	Medium	Low
Internet Physical structure	High	High	Medium
The Internet (surfing)	Medium	High	Medium
Search engines	High	High	High
E-mail	Low	Medium	Medium
Chatting	Medium	Medium	Medium
Typing	Medium	High	Medium

Table 6: Comprehension difficulty level per class

The operating system running on the computers used was Windows NT. Because of the limited time available the participants were only thought the basics: the concept of windows, how to open and close these windows (application), the desktop and the toolbar. The participants had no meaningful difficulties working with Windows. They showed great initiatives when working with, in fact, it was one of the few times they tough themselves by trying. The participants were very curious what type of other applications could be found on the computer. When the application 'paint' was found at the end of a session by a boy from class 2 sitting behind the beamer, he started trying 'painting' in front of the entire class. He did rather well and every participant was amused.

As natural it is for people that grew up surrounded by computers, as unnatural it may feel to one that has never touched a computer: 'double clicking'. The fingers of some students simply did not possess a quick enough reaction to 'double click' fast enough.

Internet physical structure

None of the participants knew anything about the Physical structure of the Internet, until it was explained to them during the WorLD pilot. Even the students from class 1, where 18 students had an e-mail account prior to the attendance of the WorLD pilot, seemed unfamiliar with the infrastructure of the Internet.

Internet (general)

One teacher from class 2 almost missed his bus back to school because of surfing the web, he had to run after it shouting; "Wait for me!"

Once the participants discovered the proper working of the Internet they were unstoppable. Both teachers and students were clued on to the monitor when given the opportunity to surf at free will. At the end of the sessions the students had to be remembered that the session had finished. During the first sessions the teachers assisted getting the students to the bus. After the third session this was no longer the case, they were the last participants to get on the bus. Most sessions of class 2 and 3 lasted for 30 extra minutes. The web surfing of the participant however was unstructured, for the reason that they had difficulties distinguishing between links and advertisements.

Search engines

Comprehending the working of a 'search engine' had shown to be a major obstacle for all participants during the WorLD pilot. After a thorough explanation of search engines, the 'Geo game' was played as an exercise to learn the how to use them. The game however, clearly showed that they had difficulties grasping the concept of a search engine. Instead of searching for specific information extracted from one of the clues given about a city, entire clues were written down. e.g. Amongst other clues, 'January weather' was given as well as 'main tourist attractions' to retrieve a city. Instead of writing down 'statue of liberty' for example, 'clue 3: mostly cloudy and windy with an average temperature of 14 degrees, sometimes snow' was written as the search query.

Using a library as a metaphor seemed to be one of the most effective ways of explaining the concept of a search engine. The books in the library being the computers connected to the Internet, the librarian being the search engine. "If you like to know something about the lions in the Serengeti, you can ask the librarian (search engine) which books (websites) talk about the 'Serengeti'? The librarian will give you a list (links) of books that contain the word 'Serengeti'. It is then up to you to find the book which contains the information you want by reading the summary".

The word 'sure' was used many times by the students. They used this word when they did not understand e.g. when asking a student if she managed to open an e-mail account she replied 'sure'. Not totally understanding what she meant, she was asked more clearly: "Did you open an e-mail account?" again she replied with "sure". Then asking, "did you fail to open an e-mail account?" again "sure" was the answer.

Using metaphors proofed to be an effective explanation method, that helped the participants visualize the structures and procedures. Metaphors are figures of speech widely used in all disciplines and essentially involve the transfer of descriptive terms from primary usage to different, but analogous, situations[37].

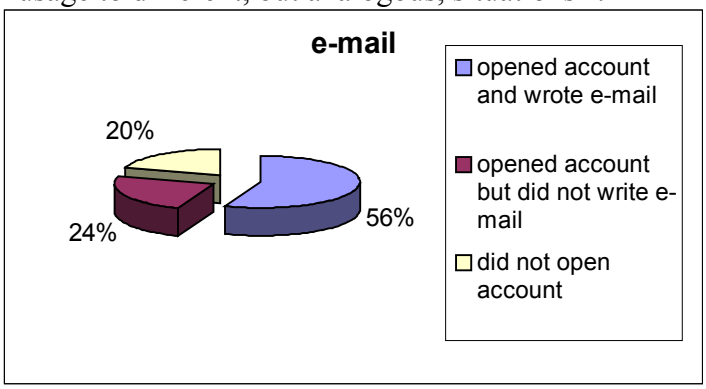


Chart 3: E-mail account statistics

E-mail

E-mailing is what the participants liked the most and understood the best (see chart 4). In class 1 there were 18 participants already having an email account, nonetheless more then 10 of them had forgotten how to open this account. The e-mail accounts created during the

[37] Ortony, A. (Ed.). (1979). Metaphor and thought. Cambridge: Cambridge University Press

sessions were yahoo.com accounts since they are free of charge and better accessible from Tanzania then e.g. hotmail.com. As shown in chart 3, 56 % of the participants managed to open an account and write e-mails. 24% opened an account but did not write any e-mail. 20 % did not succeed in opening an account. Since time was limited, and the participants had to share the computers, some students may not have had the opportunity to open one. Opening an account seemed to be time consuming due to multiple reasons: a slow connection and difficulties filling out the application form on the Internet. Although the application form was self-explanatory and while they were given a small instructions handout, some of them did not succeed. They seemed not to read the information on the screen, or that on the handouts; they had to be explained orally. The reason some students did open an account, but not write e-mail was simply because they had forgotten their login name or their password. The yahoo.com password recovery method was not effective for these students, since most of them used a 'trial on error' postal code, or did not remember the birthday they filled in simply because they did not know when they were born.

Chatting

Due to a slow Internet connection, not every participant was able to chat. Those that did chat were thrilled being exposed in real time to someone unfamiliar, from a totally different culture. Not only were the participants surprised, the respondents clearly did not expect to meet anyone from Tanzania in a chat room. At first the 'chatting' was not clearly understood, but when putting multiple participant in one chat room most of them understood. Those that did not understand clearly showed little interest and preferred to e-mail. Those that did understand asked about the meaning of icons seen on the screen. After explaining chatting could be done with speakers and a microphone or a 'web cam' the participants got real exited. Unfortunately the CSD did not possess the equipment to demonstrate such a chat session. Table 7 shows an example of a chat session of one of the participants.

A: "Hi"
B: "Hello"
A: "Where are you from?"
B: "From Tanzania"
A: "From Tanzania? You have computers there?"
B: "Yes"
A: "I'm from Sidney Australia"
A: "Are you still there?"
B: "Yes"
A: "Lets talk"
B: "I want to be your friend"
A: "Really? I would like to hear from you. How is life in Tanzania?"
B: "Life for me is not good"
A: "I suggest you come to see Sidney"
B: "Yes, of course I like to come to your country but I don't have money. Can you send me?"
A: "Yes, of course just give me your details, and how much it will be"
B: "I think it will be 300,000 tsh"
A: "Ok we will talk, I have to go back to work, I'm glad I have a friend in Tanzania."
B: "ok"

Table 7: Chat session of a 16-year-old boy

Typing

Most participants had never worked with a keyboard before. The participants had a lot of trouble locating the keys. Typing exercises were therefore time consuming. Only on one occasion did this create problems, when chatting. The participants were not quick enough to respond, which made the other party depart rather abruptly, or continuously writing: "are you still there?"

> It was hard explaining why the keys were not in alphabetical order!

"What is the participants' attitude towards technology?"

Overall computer and Internet interest

The overall attitude towards the computer and the Internet of the participants differed per topic. The Participants clearly showed a lot of interest in e-mailing, but showed less curiosity towards the history of the computer or learning how to type. Chart 4 shows the interest level of the participants. This chart was created from the data gathered from the observations and reassured with the data form the questionnaires that where handed out at the end of the pilot. The chart shows that the participants have a preference for the Internet as opposed to the computer itself. After the first session – when they learned the basics of the computer- a "stand alone" computer was no longer interesting as one that was "connected". The computer slowly shifted from being unknown technology, towards a tool to access the Internet and with that a lot of information.

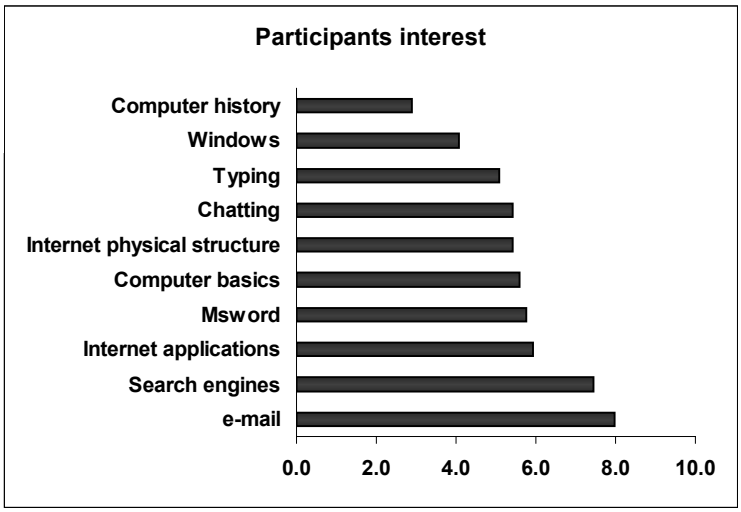


Chart 4: Participants interest on a scale form 0 to 10

4.3.3 cross class analyses

The 'WorLD pilot's' session approach was student centered, taking the focus away from the textbook and blackboard, and placing the student as the main center of activity, the main drive and meter of progress. Priority was being given to the educational goal of intellectual independence with course objectives placing more emphasis on the processes of learning and less on the course content since "It's easier to learn many other things if you first learn how to learn[38]". Table 8 shows the difference in teaching and learning methods the participants were exposed to.

"What are the differences in teaching and learning methods when implementing the WorLD pilot?"

Teaching and learning methods	**Regular lessons**	**VS.**	**'World pilot' sessions**
Approach	***Teacher centered***		***Student centered***
Focus	Facts		'Learning how to learn'
Learning	Individual		Peer learning
Teaching aids	Blackboard Textbook Pencil		Computer Internet Beamer
Teaching strategies	Lectures Demonstrations		Project based Student tryout
Subjects	Static Decided by teacher		Dynamic Determined by feedback
Teaching Material	Dated		Up to date
Students participation	Passive		Active
Students feedback	Low importance		High importance

Table 8: Difference in learning and teaching method

Having students play a more active role in constructing their knowledge and understanding appeared to be difficult, but possible. Many students shifted more and more away from their old 'fact memorizing' method towards a self-learning method during the WorLD pilot. The teachers realized this and reflected upon it: "*all the teaching material we have is outdated and restricted. We tell the students what they have to learn. If a student is interested in a subject, he is restricted to the books we can find; he has very little room for self-development. If we had computers and an Internet connection he would be given a chance. He could teach himself what he wants to learn*" a teacher from StMatthew's Secondary School said after the fourth session.

"How do the participants adapt to the teaching and learning difference?"

As the sessions went on, a distinction could be made between participants that adapted with more ease to the student centered learning method, and between those that had more trouble adapting. At this point the all classes should have been split up two ways, but was not because of organizational implications. The differentiation was very easy made by observing those that did read the information on the monitor and those that did not. Not reading the information given on the screen is an impediment to self-education. Not every participant realized this. The 'symptoms' of teaching and learning method-adapting students versus non-adapting students were observed as follows:

[38] Ashley Brilliant "Pot-Shot" No. 3412

- The adaptive student reads the information on the screen carefully, the non-adaptive student does not; he asks the instructor.
- The adaptive student is self exploratory, he explores the computer and internet on his own, the non adapting student wait for orders
- The adaptive student collaborates with fellow students, he helps out when a neighbor student needs help; a non-adapting student does the bare essentials.
- The adapting student feels more comfortable working with computers then a non-adaptive student, e.g. he has no trouble restarting it.
- The adaptive student shows interest in more then is taught and asks about it, a non-adaptive student 'waits to be taught'.
- The adaptive student is overall more active then a non-adaptive student.

Whether the teaching and learning method adaptation easiness contributes to a high comfort level with the computer and the Internet or visa versa is unclear. The adaptive students however developed more computer skills throughout the pilot then the non-adaptive student. Other factors, such as computer trust and the English language also contributed to the participant computer skills.

Language barrier

"How does the World program fit into the education curriculum of the schools participating?"

Although the student's instruction language at school is English, their mother tongue is still Swahili or another native language. Most of them only started learning English in secondary school. The difference in language created a learning barrier in all three classes. The operating system, the applications and the Internet introduced a lot of new English words that could not be translated. Without direct link to their own language, the students had trouble visualizing concepts such as 'links' or 'search engines'. During regular classes the teacher would quickly translate the English word in Swahili when he thought this was necessary. This explanation 'tool' could not be used during the pilot because the words did not exist in Swahili and the instructor's knowledge of Swahili was inadequate. The level of English amongst the participants differed a lot within each class. Those with better knowledge of the English language were in an advantaged position.

Trusting technology

Due to bad maintenance of the computers used, server problems, dreadful LAN infrastructure and slow Internet connection the computers regularly malfunctioned or responded differently then expected. These malfunctions did not contribute to the computer trust of the participants. Computer trust proofed itself to be of great importance for the motivation of the participants. When their computer did not respond as it should have responded, the students felt unlucky and de-motivated. A simple example is the log-on procedure, were the participants had to enter 'guest' in the 'user' field, as well as in the 'password' field. This was to be done in 'small letters'. When a participant was not able to log on, the cause was most probably a misspelling or the use of capital letters. However, a computer malfunction was frequently the case; a previous user had been changing the user settings or something similar. This resulted quickly in the fact that the participants automatically assumed a computer malfunction when not able to log on at once. They did not trust the computer anymore to log them on without tribulations.

4.3.4 Evaluation of the WorLD-pilot sessions

During the last session of each class, questionnaires where handed out to evaluate the WorLD pilot. The participants were asked what they liked or did not like about the pilot, what they had learned, and if they expected to use the new knowledge. The questionnaires where picked up two weeks later and then analyzed. Appendix L shows a copy of the questionnaires.

"What are the thoughts of the participants on the WorLD program?"

The WorLD pilot was very much appreciated by the participants. The Students, the teachers, the head of the schools, and even the parents of the students were very enthusiastic about the WorLD pilot. StMatthew's headmaster said that, "*The parents of the students were very happy with such an initiative, and want all their children to participate in such a program*". The headmaster furthermore indicated that it would mean a lot to him and his school if the program would be implemented at his school. "*It would improve education a lot. The students told me they liked working with computers and the Internet, and that they have learned a lot*". When the participants were asked what they had learned during the WorLD pilot, both teachers and students clearly indicated that the Pilot had made a significant impact on their knowledge and their worldviews. The following quotes will indicate this:

Students:

- "*I have learned how to deal with computers in general, deal with e-mails, search for information using the Internet, communicate or chat with other people, write and read information*".
- "*The WorLD program can help the students to open up education websites and learn so many things from outside countries*".
- "*I have learned that the computer and Internet is a library of information*".
- "*Learning about computers, chatting with people, opening an e-mail account, and searching for information was easier then I thought*".

Teachers:

- "*I will always remember you. You and your Internet have changed my live. I had no idea you could get the latest news from all over the world on the Internet*".
- "*I have learned that a computer is a world library of all disciplines. Therefore nothing exceeds computer capabilities*".
- "*I am conversant with opening an e-mail account, chatting and surfing on my own thanks to the WorLD pilot study*"

All participants revealed that they would certainly use the knowledge obtained in the WorLD pilot in the near future. 93% of the participants said that they would go to an Internet café when they would be given the chance (only 21% did this before the pilot). They would go there mainly to e-mail and to browse. 22% would go to an Internet café to search for specific information. 94% of the participants answered that they would teach a friend/family member about computers and the Internet.

The participants clearly think the World program should be implemented in Tanzania. They think it could contribute to the future development of the country. The following quotes will clarify the thoughts of the participants concerning the WorLD pilot and the future of Tanzanian secondary education:

Students

- "*The WorLD program is one of the best things I have ever experienced in my life so I wish this program to continue*".
- "*I would like to encourage the leader of the program to increase their efforts to educate Tanzanian people/society about computers*".
- "*I would like the WorLD program to continue so that I can learn more about other things, to meet with other people who participate in the WorLD program*".

Teachers

- "*This program should proceed especially in developing counties like Tanzania because it is cheap and very fast*".
- "*With time, the WorLD program will succeed in its vision and expose or connect the isolated people/parts of the world*".
- "*It is very important to learn this program because it facilitates communication without incurring much expenses, you can get the information from where you are*".
- "*The World program can mean a lot to our school as it helps the students to be up to date with current information through internet services as well as studying academic information for the betterment of their studies*".

Although the participants were overall very wholehearted about the WorLD pilot, there were some issues that were experienced to be negative factors. These negative factors were pointed out by teachers as well as students and experienced by most participants as negative:

- *The sharing of computers*
- *The computer lab was too small*
- *There were too many students instructed at once*
- *Internet was often too slow*
- *Not enough sessions*
- *Teaching speed was high*
- *Not enough connection with other students*
- *Computers were not always working properly*

Besides these factors, many participants pointed out that they would have liked the sessions to last longer. This was clearly noticeable during the running of the sessions; most of them lasted 30 minutes longer then planned. One teacher said it best when he said: "*Time allocated for studies wasn't enough given the fact that there were so many things to learn and discover*".

4.3.5 within school analyses: 13 critical issues

"What are the critical issues of the WorLD program?"

Before beginning to ensure new technologies are seen as ubiquitous and not elitist tools in the Tanzanian secondary education system, many challenges have to be overcome. The previous chapters focused on the participants of the WorLD pilot and the educational aspects. Bridging the digital divide in Tanzania however involves much more then teaching students and teachers how to work with computers.

Technical, managerial and economical as well as educational issues are just as important for the realization of a program such as the WorLD program. During the preparations stage, introduction stage and running stage the researcher encountered expected as well as unexpected barriers. These barriers are characteristic for Tanzania, and are to be considered when implementing the WorLD program in Tanzania. Besides the "hands-on" obstacles encountered during the three stages of the WorLD program, the information that was set aside -because of irrelevancy to the specific objectives and research questions- was reinstated and analyzed to serve the main objective off this research (As described in 1.3.3). The next chapter describes the educational, technical, organizational and economical issues that have been uncovered during the three stages of the WorLD pilot.

Educational

Critical issue 1: Educational paradigm shift

The WorLD pilot has shown that there is computer awareness amongst the students, the teachers and the head of schools; computer knowledge is seen as important and valuable knowledge. However, there is no to very little awareness of the educational change it involves. Some students proofed to have difficulties adapting to the 'new learning and teaching' method; they were not learning how to learn. Providing the secondary schools, with computers, software and network facilities is an obvious improvement of the availability of materials and technical infrastructure, but has little impact on content or on the role of the actors in the process. Only in conjunction with changes in the role of the teacher and the student, the content and organization of curricula, and corresponding curriculum materials is it possible to realize 'new' education, and to incorporate in it the potential for enhancing and renewing the learning process contained in a new technical infrastructure[39].

Critical issue 2: Lack of computer education material

When preparing the sessions for the WorLD pilot, little functional computer education material was found within Tanzania. The only official Tanzanian computer syllabus was developed in 1996 and issued in 1997, thus useless for the pilot. There were some sheets to be found used in computer courses given at the UDSM, however these were of little value to the WorLD pilot. These sheets would e.g. describe all the functions of MSWord into great detail or explain how to install a printer. No 'student centered' material was found, material that would teach the students were to find the information needed to install a printer, or the tricks in MSWord. Neither world Links, nor the World Bank had made any educational material available on their website or by other means. The course was therefore self-developed, containing many projects and exercises focusing on 'learning how to learn'. The objective

[39] Plomp, The learning process depicted as a result of activities and conditions for learning, 1999

was to give the participants useful knowledge instead of 'facts' they would probably forget. The education material and projects were developed with the help of 'IEARN'.

Critical issue 3: Lack of National IT policy

The National ICT policy of Tanzania may 2002 states the current ICT situation in the education sector but very little about possible solution towards the shortcomings stated. The national policy does not provide solutions or insight in the future plans of the government. The lack of ICT framework keeps the schools and organization in the dark and disstimulates them to take immediate action towards active steps in providing computers and connection in secondary schools.

Technical

Critical issue 4: Lack of reliable electricity

Of the 18 sessions scheduled for the 'WorLD Pilot' two had to be rescheduled because of power failure. Power failure is very common in Tanzania. A power failure can last from 5 minutes up to 24 hours. The duration is not known in advance which makes planning difficult. The computers at the CSD had UPS's (un- interrupted power supply, a sort of battery or short term power source) but were insufficient powerful for the running of a session. If they were, the heat in the lab would be unbearable due to a non-working air-conditioning and the warmth generated by the computers.

The major power plant Tanesco (Tanzania Energy supply company ltd.) is responsible for generation, transmission and distribution of electricity in Tanzania. The main source of generation is hydropower but also have some thermo generation in the form of gas turbines and diesel engines, which are all running on liquid fuel. Before 1992, Tanesco used to enjoy the monopoly being the only supplier of electricity in the country. But in 1992 the monopoly was lifted, so other people could come in, install their own generation facilities, sell power either directly to consumers, or to Tanesco. From 1992 until 1997 the company coped with a major energy supply[40], but has created a better image since then. Tanesco is still the dominant supplier of electricity in the country. During the running of the pilot, the government was busy restructuring and privatizing Tanesco. The privatization of the firm is expected to take off after finalizing the 'disbanding' exercise that will see Tanesco curved up into three independent sections. The sections, generation, transmission and distribution will be created in order to attract investors because they are expected to be more efficient and competitive. The total privatization of Tanesco is set to start with distribution first, which should be completed in the next three years.

Besides the lack of reliable energy, it is expensive. Due to poor management, lack of capital and technology, high operational costs, power tariffs in Tanzania are comparatively the highest in the region, despite the recent review[41]. Electricity in Tanzania is seen as a luxury commodity rather than a 'basic need' item. Only 10 per cent of Tanzania population currently access electricity[42]. Supplying rural schools with electricity that cannot be met by grid extensions alone, will require other forms of electricity supply, for instance; isolated

[40]Mr. Baruany Elijah A.T. Luhanga, Managing Director Tanesco
[41] Fred Lugano, Utility sector set for major improvement, The Investor #2 July, 2002
[42] Daily News, Power bills defaulters face Tanesco wrath, June 12, 2002

systems based on hydropower, diesel engines or solar systems. Tanzania's future plans are aimed at increasing the access of the population to electricity and general improvements of power supply availability and quality[43].

Critical issue 5: Lack of good working computers & technical support

There is a shortage of computers in Tanzanian secondary education. In fact there is a shortage of practically everything in Tanzanian secondary education. Starting from chairs and tables to books and pens, especially amongst rural schools. The WorLD pilot was run in the computer lab at the CSD for the reason that the participating schools had a lack of good working computers. Providing Tanzanian secondary schools with computers is merely harder then providing them with pens. Just 9 years ago (from 1974-1993) importing computers to Tanzania was prohibited, today it is free. Companies in developed countries are practically searching for charity projects to 'donate' their 'old' computers when renewing theirs[44].

However, this could turn Tanzania in a dumping ground for outdated computers that are no longer in use in the developed world. Computers contain hundreds of toxic substances, with lead, mercury, and cadmium topping the list. Just about every piece of equipment is a culprit, from monitor glass to circuit breakers and the outer plastics. And if the machines end up in landfills, those chemicals can end up in your groundwater, air, and soil. Without the proper maintenance the donated machines would render themselves useless within a short time span. The computers at St Matthew's secondary school were never maintained: "To expensive and not worth it" as the headmaster put it. Indeed, it's hard bridging a digital divide with outdated computers. The computers in the computer lab at the CSD also suffered from a myriad of hardware and software problems. Dusts, heat, humid, electrical peaks, viruses, all contributed to an extreme wear and tear of these machines.

Maintaining computers in Tanzania is problematic. All-time computer technicians in Tanzania are scarce and expensive. When one would be hired and trained he would not stay. He would be lured away to more lucrative jobs elsewhere, leaving the school to start elsewhere. Scarcity of spare parts for computers is another major problem for the whole country. Many vendors concentrate on importing computer units but not spare parts or other accessories.

.

Critical issue 6: slow to no Internet connection

The Internet connection at CSD was cheerless to say the least. Data speed above 1 Kb/s was almost never achieved during the WorLD program. A transfer rate of 100 B/s was not unusual. The Bandwidth made available by the ISP is shared with many organizations, businesses and individuals making high-speed connection possible only during a power cutoff when using an UPS.

Getting every computer connected before/during the sessions of the pilot proofed difficult, due to bad maintenance of the pc's and the LAN. IP addresses had to be re-configured or the server electrical plug had to be re-plugged after someone had incidentally stumbled over it without noticing. Many problems could have been avoided if the computers would have been properly maintained, and the room kept neat.

[43] Mohammed Saleh, Tanzania Electricity Supply Industry trends, ESI Africa 2 2002
[44] For more information: www.computer-aid.org

Most Internet café's are connected with the Internet trough a wireless local loop. Reliable fixed line connectivity is still mostly limited to only urban areas in Tanzania. StMatthew's recently had a fixed line installed, but was highly unreliable. It would be very difficult and highly inefficient establishing a connection over that fixed line.

Organizational

Critical issue 7: Difficulty completing computer activities within the school's daily schedule

The two schools participating in the WorLD pilot had a busy and tight schedule. Especially the teachers had little free time. Since the pilot was only periodic it was seen as an extra curricular activity. It was not always easy aligning their schedule, to the schedule of the computer lab at the CSD. Busting in with an ICT program will require major curriculum adaptations within the schools. The schools schedules, teaching methods and subjects have been the same for many years. Adaptation is therefore not evident and will require time.

Critical issue 8: Corruption

Like in many other countries corruption is a major problem in Tanzania. The difficulty of getting basic needs has lead to the introduction of permits, which has practically fuelled corruption in the country[45]. It has now almost become the normal way of life. The amount of corruption can drastically hinder organizing the setting up of the WorLD program. An introduction of the WorLD program involves allocating money for computers electricity, buildings, Internet, education etc. It involves getting authorization of different institutions, dealing with many people and collecting many stamps. All authorities are potential corruption zones that need a long breath of patience when endeavoring. The government has put in place a number of institutions charged with the responsibility of fighting corruption in the country so far. Among such institutions is the Anti Corruption Bureau (PCB) and the Ethics Commission headed by William Maina, a retired High Court Judge. These measures will hopefully have a high positive effect and spare the WorLD program the menace.

Critical Issue 9: uncoordinated efforts

There is a reasonable amount of organizations aiding to bridge the digital divide. Development aid has a considerable importance for the economy. The aid comes from many different sources that do not co-ordinate their efforts, nor is the government able to do that efficiently. Besides The WorLD program, there is VI@frica targeting the secondary education, IICD, and many more. VI@frica is developing a computer lab that will be used for education for the schools pupils as well as for external classes for surrounding schools, courses for the local community and government. IICD has a Global Teenager Support Center that has been set up in the outskirts of Dar es Salaam. None of these organizations with practically the same objective seem to actively cooperate. Ironically, since their aim is to set up secondary school collaboration projects.

[45] *Gitau Warig,* East and East-Central Africa, 2001

Critical issue 10: Teacher shortage

There is a shortage of teachers throughout Tanzania. According to a UNESCO-ILO[46] study, there can be as many as 100 students to one teacher in some schools. During the running of the WorLD pilot, the younger teachers were very interested in the 'job sites'. They wanted to learn how to find and apply for jobs with use of the Internet. They had little intentions in working as teachers much longer. If the opportunity towards another job arose, they would take it. The Internet could provide these opportunities, and with lure the teachers away, leaving schools with a bigger demand for teachers.

Critical issue 11: Rural VS Urban

Part of this research was initially set out to focus on the difference between boys and girls and their way of interaction with computers and the Internet. This difference however seemed to be marginal. The difference in school however has shown to be of greater importance. The barriers for implementing the WorLD program in a rural school, lay a lot higher then that of an urban School. A rural school is:

- Less attractive for teachers to work
- Harder to connect to the Internet
- Harder to supply with electricity
- Isolated from the news
- Usually more dusty
- Likely to be far away from an Internet café
- Economically less stable
- Harder to reach and therefore
    - More difficult to supply with computers
    - More difficult to procure with maintenance
    - More difficult to supply with healthcare (e.g. when teachers get ill)

The need for the WorLD program is greater in rural schools than in urban schools due to some of these barriers. More urban schools students have been acquainted with computers and have easier access to the Internet trough Internet cafes. The WorLD program could make rural schools more attractive for teachers to work and create opportunity for the school to improve economically and become less isolated. Selecting schools will not be an easy task.

Critical issue 12: Internet side effects

Outside Tanzania's major cities, one is still a long way from the western-style eruption of the information age. Introducing Internet in secondary schools in Tanzania means exposing the next generation to more then the positive aspects:

- English-language materials overwhelmingly dominate the web that could lead to "Americanization of the culture". The students participating in the WorLD pilot were very interested in music and movies. E.g. Cristina Aguillera sites were visited.
- Internet comes with Porn. Porn is illegal in Tanzania and 50% of the students are Muslim. No participant of the pilot was seen watching porn, in Internet café's however, it is one of the main attractions.

[46] Siniscalco Maria Teresa, A statistical profile of the teaching profession, 2002

- Chat rooms are not regulated. Students can be manipulated and misused by a person with the wrong intentions. During the WorLD pilot the students chatted in 'education' related chat rooms. One teacher however unintentionally ended up in a 'gay' chat room.

Critical issue 13: financial shortcomings

'Money is what makes the WorLD program go round' and unfortunately there is not a lot of it, especially in Tanzania there is not. The WorLD pilot was not funded at all. The schools provided their own transportation, and the computer lab of the UDSM was used. Other then that, no money was spent. This shows that resourcefulness and willingness can to a certain extend replace money. If money had been provided, the education could have been improved. Extra trainers, more computers and more educational material could have been provided. On the other hand, the students and the teachers have never learned so much with so little spending.

4.3.6 Conclusion

They critical issues described create a perpetual paradox: In order to overcome the barriers formed by the critical issues, the country needs to leap towards development; the barriers however restrain this needed development. In other words: a program such as the WorLD program could (in the long run) help overcome many of the critical issues. The critical issues however intensify the difficulty of implementation of such a program. The cycle seems almost impenetrable, and is comparable to the chicken egg dilemma. What should be solved first? The critical issues, so that ICT's can be introduced properly, or should ICT's be introduced first, so that the critical issues can be overcome? The next chapter provides recommendations concerning the introduction of ICT's in Tanzanian secondary education, and a possible solution towards breaking the cycle.

5. RECOMMENDATIONS AND CONCLUSIONS

5.1 Recommendations

Although the WorLD program provides the opportunity to start a cycle of sustainable development, the path from opportunity to effectiveness is neither easy nor predetermined. In estimating an educational project's potential for success, decision makers should take into account four characteristics: desirability, feasibility, affordability, and sustainability.[47] This recommendation paragraph describes how these four characteristics relate to the WorLD program.

Desirability

The World pilot illustrated that the introduction of computer and Internet into Tanzanian secondary education is desirable amongst secondary school headmasters, teachers, students and even the parents of the students. The WorLD pilot responded to identifiable needs of both Janguani Secondary School, and St Matthews' Secondary School. They showed a lot of support, and were both willing to invest time and money (transportation costs). Computers and the Internet however can be introduced in different ways and suit multiple goals, some ways and goals are more desirable than others. The following recommendation can be made towards desirability:

Leave room for pedagogical adaptation
The WorLD program strongly focuses on integrating computers and the Internet in the education curriculum, requiring an immediate major change in the teaching and learning method, leaving very little room for adaptation. The WorLD pilot however strongly pointed out that the demand for basic computer and Internet skill training is much higher. By initially offering a more basic computer course and slowly moving towards the needs of the students and teachers, more room for adapting to the pedagogical changes involved would be given.

Adapt global technologies to local needs
The WorLD program is an American formula and involves many educational steps that are stipulated, leaving little room for the students and teachers to build an own capacity to master and adapt global technologies to their needs. By offering a customized program that can continuously be altered to the needs of the Tanzanian teachers and students, they are given the opportunity to appropriately adapt the technology to their needs.

Feasibility
A feasible project is one that may be accomplished within an established time frame, available personnel, and budget. The WorLD program will have to endeavor all the critical issues that were encountered during the running of the pilot. These issues are time, budget, and people consuming, taking the focus away from the students towards the sustainable cycle discussed at the end of chapter 4. The WorLD program therefore also risks being discarded

[47] Haddad, W. (1994). *The Dynamics of Education Policymaking: Case Studies of Burkina Faso, Jordan, Peru, and Thailand.* EDI Development Policy Case Series, Analytical Case Studies, No. 10. Washington: The World Bank.

as a failure, when, due to the critical issues, it was not given an opportunity to succeed. The following recommendations toward feasibility are made:

Think broad, not deep
The WorLD program targets a small portion of the secondary schools within Tanzania and implements big. It intents to create a global learning community from scratch, actually steering the schools in a direction, leaving little room for the students, teachers and community to find their own purposes with new technologies. Cellular phones have found their use within Tanzania; the market is growing tremendously, while it is a very poor country and while there has never been such a thing as a 'cellular program'? Why not target a big portion of the secondary schools, and implement small? The WorLD pilot has proofed that one person has given over hundred people a knowledge base for working and learning with computers and the Internet with very little resources in 6 months time. The integration of computers and the Internet could be taking place more simultaneously, creating an even spread of computer literates, facilitating the technological adaptation within Tanzania.

Act now
The WorLD program involves a complex and long implementation scheme that will take a long time. A short-term introduction project that is based on simplicity could bridge the timeframe between now and the actual implementation of the WorLD pilot (see the proposed project).

Affordability
The concept of affordability is relative to the benefits expected from the project in relation to its costs. The WorLD program intents to equip the schools selected for the project. This means providing reliable electricity, a suitable computer room, software, hardware, and an Internet connection. The costs that are going to be made are relatively high, taking the amount of secondary student reached into account. The costs might still be relatively to the benefits, however the money might be used more efficiently, reaching more students

Start with what is available
Schools do not need to be equipped (in the beginning). Existing computer labs can be used instead, as was the case during the running of the WorLD pilot, which took place in computer lab of the CSD of UDSM. Deals can be made with Internet café's, which usually have, up to date, in good condition working computers that are linked to the Internet continuously. Doing this strongly alters the WorLD program's objectives, but it's cheaper and quickly employed. It also takes of the pressure in selecting the right school. It can even be used as a test phase, before truly installing the computers and connections.

Sustainability
The WorLD program involves many stakeholders, making the program complex and more vulnerable for failure. If e.g. a party does not hold up his end of the bargain, the program will be delayed or even terminated. If there is a failure of the provision of sustainability in a particular school, the previous efforts are gone to waist. When implementing a 'smaller version' of the WorLD program the sustainability part is of lesser importance.

Recommended implementation strategy for introducing computer and the Internet in the Tanzanian Secondary education sector:

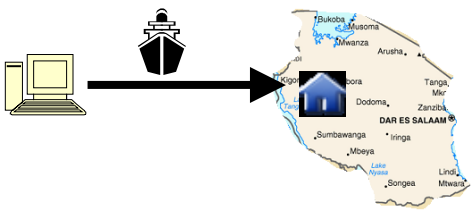
For a quick launch of the Introduction of ICT's into Tanzanian secondary schools that takes desirability, feasibility, affordability, and sustainability in account, it is advisable to start with what is available. Computers in Tanzania might be scarce, but they are present. Internet café's, learning institutions, companies, and governmental institutions are in possession of computers that are connected to the Internet. These can be found and used.

By locating all computers that are suitable to be used by Secondary School Students, a simple and straightforward (sponsored) project that includes students with computer knowledge can be put into place. This project does not substitute the WorLD program, but is best run prior to the WorLD program. These students (teach-students) can be e.g. Tanzanian University students or foreign University students conducting the project as an internship or for personal experience. Each Teach-student can be assigned to a certain district, where he carries out the following phases:

1. **Locating the computers** suitable for secondary students within the teach-students' district. The availability of Internet café's shouldn't be problematic when offering a financial contribution. Internet café's in Tanzania are not expensive (Tsh 500 per hour per computer = 0.50 Euro).
2. **Locating all secondary schools** in a certain range of the suitable and available computers. If there are more schools than the University can handle, multiple teach-students can work in one district. If the amount of secondary schools exceeds the computer availability, schools can be chosen according different criteria such as proximity or transportation ease.
3. **Approaching the located schools**, and present the project. The WorLD pilot showed that schools are keen on computer education, and are enthusiastic to cooperate.
4. **Finding means of transportation** for the school if they do not have transportation. Most schools in Tanzania have their own transportation, and if they do not, it should not be hard to provide it cheaply.
5. **Schedule the classes,** and create an itinerary for a selection of the school students.
6. **Teach the classes.** The educational material needed can be put on a central website that can be accessed by the teach-student and used at will. The web page can also be use to discuss problems encountered by the US's and call in for help by a colleague in a surrounding district. The website can even be used to attract students/sponsors to learn about the project and to subscribe for the project.

After a certain period of time, the teach-students can be substituted by a new teach-student or even a secondary school teacher or student that has followed the course.

WorLD program



Proposed project

Benefits when running the proposed program prior to the WorLD program

- The recommended project can be implemented faster then the WorLD program. When implementing the WorLD program all critical issues have to be overcome, consuming time and money.
- The recommended project starts with basic computer and Internet skills training, leaving room for pedagogical adaptation.
- The recommended project is a "hands-on" project that can be object to change without major consequences, leaving room to adapt the technologies to local needs.
- The recommended project is much cheaper then the WorLD program because it draws on existing resources and creates a win-win situation for the University students and the schools
- The recommended project consists out of multiple little projects carried out by different people, making it less vulnerable for total failure, contributing to sustainability. The WorLD program is one big coordinated and linked project, subject to total success, or total failure.
- The computer maintenance is outsourced and trainers easier expendable
- When using the project described as a base for WorLD program, there will be more information and know-how concerning the implementation of ICT's in to Tanzanian secondary education, increasing the chance of success.

The project described has the potential to quickly increase the computer literacy rate amongst secondary students, and create a direction for a formulation of an ICT policy that will fit the Tanzanian culture.

ICT policy recommendations

The role of the ministry of education and culture is critical. It is up top them to articulate a vision for the use of ICT in education and linking it with national goals and standards to really highlight the importance of technology in education in Tanzania. The current policy concerning ICT in education is not targeting its goal. Instead of pointing out the tribulations within ICT the ministry should exercise proactive leadership and initiate bold steps to implement their articulated vision of ICT in education. The policy should include:

- Maximize access to current hardware, software, and the Internet
- Create a plan for the location of all connected computers
- Facilitate programs for attracting University students to teach secondary students and teachers
- Promote involvement of the private and public sector of Tanzania in secondary education and technology.
- Build a communication structure between all stakeholders including other ICT educational aid programs in Tanzania, secondary schools, universities, the Ministry of Education, the Institute of Education, possible sponsors, and others

Besides creating a policy the Ministry of education should be actively involved in the implementation, by attending teacher training session, visiting schools, computer classes, students and teachers, so that it will be able to evaluate and adapt its ICT policy for secondary education over the years to come. By involving itself in the dynamic education process it will be able to stimulate and encourage support from all stakeholders contributing to the secondary educational system.

5.2 Conclusions

The WorLD pilot in Tanzania has had remarkable impact on both teachers and students, particularly with regard to attitudes toward technology and the development of new technological skills. The schools, the teachers and the students have proven to be more then ready for the introduction of computers and the Internet at their school. They are aware of the fast rising technological world and are eager to be part of it.

A first step
The WorLD pilot has been a first step towards the introduction of a challenging but promising program. Challenging because of the considerable change in education it brings and because of the nature of the country, its culture and its customs. Promising because of the opportunities it could create for the students, the community and Tanzania. Implementing the WorLD program can be made as challenging as one aspires, depending on the scale, the choice of school and its position.

Critical factors not the students or teachers
The WorLD pilot has shown that it was not the schools, the headmasters, the teachers or the students being the critical factors, but the current ICT policy concerning secondary education and Tanzania's financial situation. The schools, headmasters, teachers and students have proven to be willing and capable computer learners. They will certainly seize the opportunity and make the best out the program when chosen to participate. They have proven to be resourceful and enthusiastic towards the introduction of computers and the Internet into their schools.

WorLD pilot vs. WorLD program
The success of the WorLD pilot does not guarantee the success of the WorLD program in Tanzania. The WorLD pilot made use of existing resources, was carried out by one person, and was adapted to the needs of the Tanzanian students. This made it cheap, quick, personal, the critical issues were bypassed and many students and teachers were reached. The WorLD program is more complex, expensive, deals with many stakeholders and will have to deal with all critical issues. The WorLD program therefore needs to scale down and prioritize their objectives, commencing with focusing on providing basic computer and Internet training for secondary students, with the recourses available.

Implementing the WorLD program
When implementing the WorLD program as is, the obstacles to be overcome could lead to a distortion of the objectives to be met. Using the computer and the Internet as a learning aid by connecting the students with other WorLD program participants to collaborate in projects, are long terms goals that will have to endure a lot of challenges. These challenges are unknown, but could differ from technological shortfalls, such as deficient hardware and software and poor Internet connectivity and power cut offs to organizational, educational and economical disturbances. Due to these barriers the WorLD programs achievements could eventually differ from its actual objectives; instead of becoming a collaborative distance-learning program, it will grow to be a computer education course were little integration into the curriculum takes place, and the connectivity aspect has taken forms of minor importance. While very expensive, the WorLD program has tendencies to become no more then an ordinary computer class, where technology will be used primarily for computer science projects and for the development of specific computer skills. If it grows to become this, cheaper, and more culture minded options could have been taken.

Relocation of the divide

Although the WorLD program is a step towards the right direction for the secondary education sector in Tanzania, it targets only few schools, leaving many schools in the dark. Instead of 'bridging the digital divide' it is relocating the divide, now placing it within the country itself. It will create an in equilibrium within the secondary education sector resulting in a knowledge partition amongst students. While creating better futures for those students participating in the pilot, it is diminishing the chances of those students not participating. The answer therefore lies in the implementation of a direct simple and structured plan, using available recourses, that focuses the needs of the Tanzanian secondary education sector, while reaching many students. The WorLD program can be put into place when the students have adapted to the educational change and have accepted the new technologies within their culture.

5.3 Research limitations

Due to the nature of this research, the time span and the environment, this research was subject to several limitations. These limitations have been taken into account by the researcher (were possible) to the best of his abilities, but could still have affected the accuracy of the findings. One significant limitation was of a somewhat contradicting nature, for the reason that it was due to the friendliness and helpfulness of the participants.

Compared to western society, the Tanzanian people could be described as being extreme friendly. Saying 'no', or delivering criticism is considered to be very rude in Tanzania, making it difficult to get objective answers or feedback from them. As described in paragraph 4.3.1, the participants avoided being rude to the researcher at all cost (e.g. by simply answering with 'sure') deforming the outgoing impression from a possible 'negative' one, into a 'positive' one (comparable to eating the food your guest has prepared and stating it to be delicious, while not finding it tasteful). All answers given by the participants were therefore not taken literally, but toned down slightly (e.g. 'great' was interpreted as 'good', and 'good' as 'average'). The look in their eyes as well as body language also played an important role in interpreting feedback. Nevertheless, it can be said that getting straightforward answers or feedback was problematic.

Besides friendliness, the researcher was limited by time and labor force, limiting him in its research population. Although the research was carried out amongst 14 teachers and 81 students of two schools, this still represents a small portion of all school/students/teachers in Tanzania. Most outcomes of this research are therefore valid for these schools only, and do not represent other schools or students. It is therefore recommended doing similar research in schools in different district e.g. Dodoma or Arusha.

REFERENCES

ADEA.*What works and what's new in Education: Africa speaks*. 2001, Paris

B.M. Makau, *Computers in Kenya's secondary Schools*, Case study of an innovation in education, 1990

CIA, *World Fact book*, July 1, 2001

Daily News, *Power bills defaulters face Tanesco wrath*, June 12, 2002

Eisenhardt, *K. M., Building theories from case study research*. Academy of Management Review, 1989

Fouché, Ben. "*Towards the Development of an Equitable African Information Society*." African Development Review 10 (June/July). 1998

Fred Lugano, *Utility sector set for major improvement*, The Investor #2 July, 2002

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.); White Plains, NY: Longman.

Gitau Warig, *East and East-Central Africa*, 2001

Haddad, W. *The Dynamics of Education Policymaking: Case Studies of Burkina Faso, Jordan, Peru, and Thailand.* EDI Development Policy Case Series, Analytical Case Studies, No. 10. Washington: The World Bank. 1994

Hawkins. Robert. J, *Ten Lessons for ICT and Education in the Developing World*, 2000

ITU, *World Telecommunication Development Report,*1998

Lewin, Keith and Francoise Caillods. *Financing Secondary Education in Developing Countries: Strategies for Sustainable Growth*. UNESCO/IIEP, 2001, Paris

Merriam, S. B. *Qualitative Research and Case Study Applications in Education*.

Mohammed Saleh, *Tanzania Electricity Supply Industry trends*, ESI Africa 2, 2002

Mr. Baruany Elijah A.T. Luhanga, Managing Director Tanesco

National ICT policy of Tanzania, *First order draft*, May 2002

Ortony, A. (Ed.), *Metaphor and thought*, Cambridge: Cambridge University Press,1979

Patton, M. Q., *Qualitative Evaluation Methods*, (2nd ed.) Thousand Oaks, CA: Sage, 1990.

Plomp, *The learning process depicted as a result of activities and conditions for learning*, 1999

Robson, C. Real World Research*: A Resource for Social Scientists and Practitioner-Researchers*, London: Blackwell, 1993.

SADC e-Readiness Task Force, *SADC e-Readiness Review and Strategy* - Recommendations of the SADC e-Readiness Task Force, 2002

Siniscalco Maria Teresa, *A statistical profile of the teaching profession*, 2002

Source UNESCO, *World Education Report*, 2000

SRI International, *Uganda country report*, 1999-2000

SRI, *Accomplishments and Challenges Monitoring and Evaluation Annual Report*, 1999-2000

UNAIDS. 2000. *HIV/AIDS and the Education Sector*. Programme Coordinating Board. 11 April 2000, Geneva

UNCSTD (United Nations Commission for Science and Technology Development) 1995

UNDP, *Human Development Report*, 2001

UNFPA, *The State of World Population*, 2001

UNICEF, *The State of the World's Children*, 2001

VET in Tanzania , *The reform experiences* 1990 – 1999, p 9

WorLD Links folder, *opening a world of learning*…, 2002

Yin, R. K. *Case study research: design and methods* (2nd ed), Thousand Oaks, CA: Sage, 1994.

WEBSITES:

http://www.challenge.stockholm.se

http://www.cicat.tudelft.nl//PenS/index.cfm?PageID=2764

http://www.computer-aid.org

http://www.Ethinktanktz.org

http://www.global-learning.org/en/index.php3

http://www.gsn.org/project/gg/index.cfm

http://www.iearn.org/

http://www.iicd.org/globalteenager/

http://www.schoolsonline.org/

http://www.undp.org/dpa/frontpagearchive/2002/march/05mar02/

http://www.worldbank.org/worldlinks/english/

http://www.world-links.org/English

Appendix A: Questionnaires computer knowledge teachers

Teachers: St Matthew's Secondary School

School information:
Is there a computer class in your school? Yes/ no

How many computers are there? …

Of which…. Not working and …. working

Is there an Internet connection in your school? Yes/ No

Personal information:

Name:

Age:

Years teaching:
Subject:

What is your qualification:

Computer knowledge Questions:

Do you have computer experience? Yes/ No

If yes, where did you obtain this knowledge? …….

Do you own a computer? Yes/ No

When was the last time you've worked with a computer? ……..

Please check the box that applies best for each ***operating system:***

Are you familiar with?	Never heard of	Heard of but never worked with	A little experience	Experienced	Very experienced
Windows 3.11					
Windows 95/98					
Windows NT/ Me/ Xp					
Dos					
Macintosh					
Unix					
Linux					

Please check the box that applies best for the ***software:***

Are you familiar with?	Never heard of	Heard of but never worked with	A little experienced	Experienced	Very experienced
Word					
Excel					
Power point					
Paint					

Internet knowledge

Please check the box that applies best for the following

Are you familiar with?	Never heard of	Heard of but never worked with	A little experienced	Experienced	Very experienced
The internet					
e-mail					
outlook					
Internet explorer					

Do you have an e-mail account? Yes/ No

If yes where do you read it? ……..

Project based learning

(Project-based learning (PBL) is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, student-centered, and integrated with real world issues and practices. PBL provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems..)

Are you familiar with the concept of Project based learning? Yes / No

Do you conduct classes using the project based learning method? Yes/ No

---

Open questions

In short could you describe why you decided to participate in this Pilot?

……

……

……

……

……

In short, could you describe your opinion about what computers and the Internet can mean for the secondary education in Tanzania?

……

……

……

……

……

How do you think this pilot will affect the students? What do you expect them to learn?

……

……

……

……

……

What do you expect to learn from this pilot?

……

……

……

……

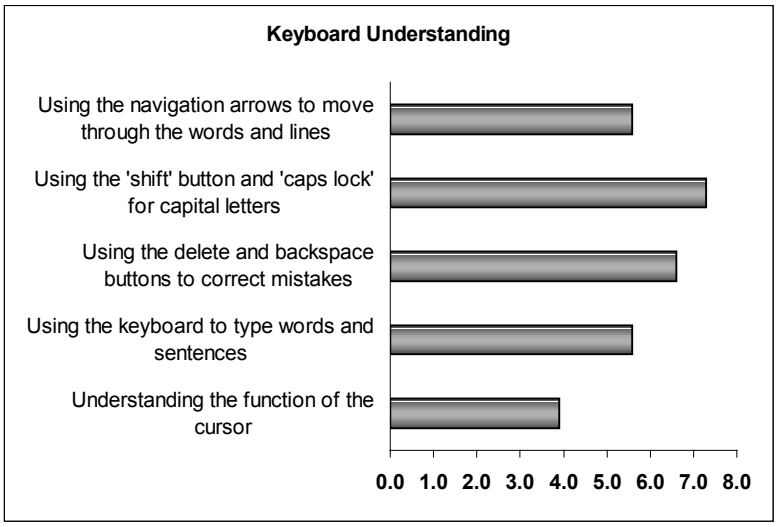
Thank you!

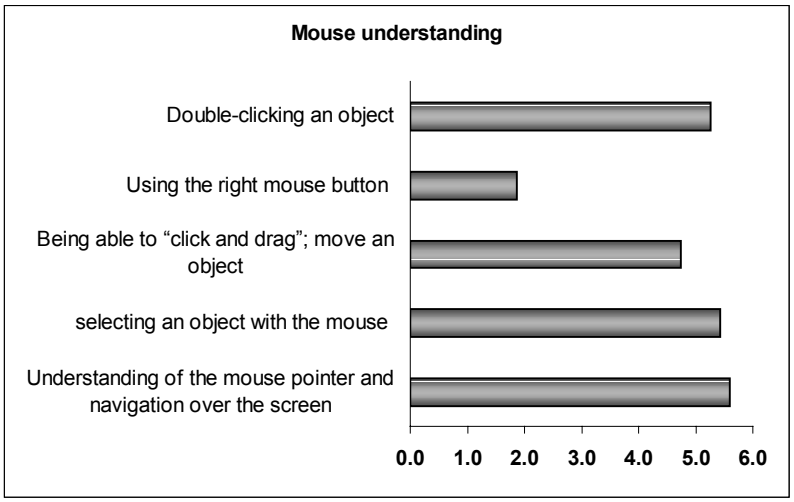
Appendix B: THE CLASS SESSIONS LOG

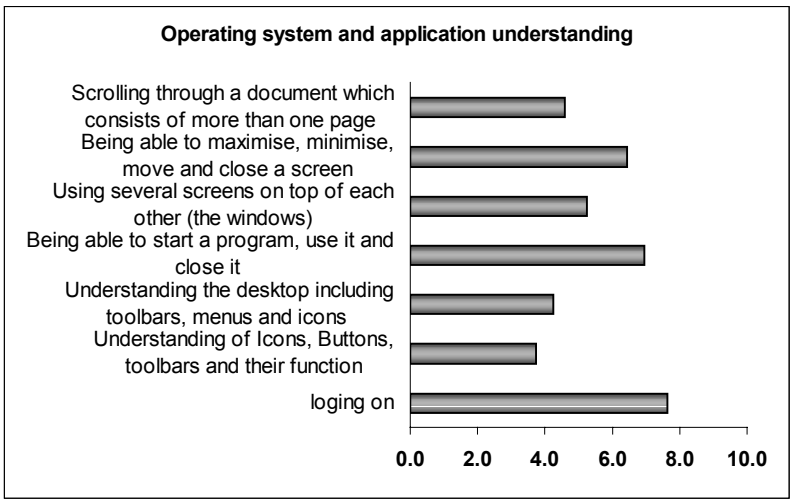
Nr	Day	Time	Class	Session Nr.	Attendance	Nr computers working (Out of 18)	Remarks
1	Wednesday 8 may, 2002	18:00 – 20:00	Class 2	N.A.	2 Teachers	N.A.	Teacher update
2	Friday 10 may, 2002	12:00 – 14:00 16:00- 17:30	Class 1 Class 2	1 1	30 students/ 3 teachers 30 students/ 4 teachers	17	
3	Saturday 11 may, 2002	11:00 – 13:00	Class 2	2	28 students/ 4 teachers	16	2 students with Malaria
4	Friday 17 may, 2002	12:00 – 14:00	Class 1	2	30 students/ 3 teachers	17	
5	Saturday 18 may, 2002	11:00 – 13:00	Class 2	3	27 students/ 5 teachers	15	3 students with Malaria
6	Tuesday 21 May, 2002	18:00 – 20:30	Class 2	N.A.	2 teachers	N.A.	Teacher update
7	Friday 24 may, 2002	12:00 – 14:00	Class1	3	16 students/ 1 teacher	16	National Holliday
8	Saturday 25 may, 2002	11:00 – 13:00	Class 2	4	27 students/ 4 teachers	18	Assistant: Mr. I Nnafie
9	Wednesday 29 may, 2002	16:00 – 18:00	Class 3	(1)	Cancelled		School had transportation problem.
10	Friday 31 may, 2002	12:00 – 14:00	Class 1	(4)	Cancelled	0	No electricity at CSD
11	Saturday 1 June, 2002	11:00 – 13:00	Class 2	5	21 students/ 5 teachers	16	Malaria/ Word Cup
12	Monday 3 June, 2002	16:00 – 18:00	Class 3	1	17 students/ 4 teachers	16	Students stayed in school for exam preparation
13	Tuesday 4 June 4, 2002	12:00 – 14:00	Class 1	4	28 students/ 2 teachers	17	Very slow internet connection
14	Wednesday 5 June, 2002	16:00 – 18:00	Class 3	2	21 students / 4 teachers	15	Students stayed in school for exam preparation
15	Friday 7 June 4, 2002	12:00 – 14:00	Class 1	5	28 students / 1 teacher	15	

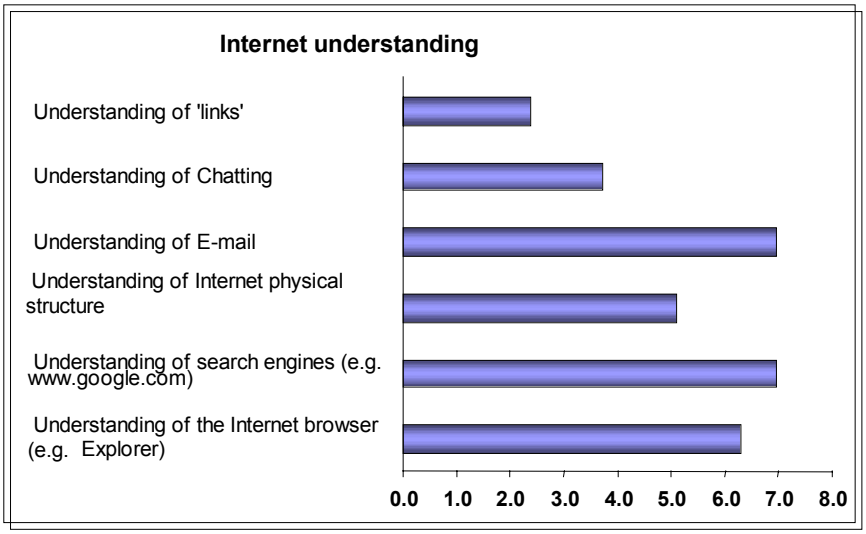
16	Saturday 8 June, 2002	11:00 – 13:00	Class 2	(6)	Cancelled	0	No electricity at CSD
17	Wednesday 12 June, 2002	16:00 – 18:00	Class 3	3	20 students/ 2 teachers	15	
18	Saturday 15 June, 2002	11:00 – 13:00	Class 2	(6)	Cancelled	N.A.	Miss-communication
19	Tuesday 25 June, 2002	16:00 – 18:00	Class 3	4	20 students/ 3 teachers	17	
20	Friday 28 June, 2002	16:00 – 18:00	Class 2	6	29 students/ 4 teachers	17	
21	Wednesday 3 July, 2002	16:00- 18:00	Class 3	5	20 students/ 4 teachers	17	

Appendix C: 'WorLD pilot' participant computer understanding on a scale from 1 to 10.








Internet understanding
Understanding of 'links'
Understanding of Chatting
Understanding of E-mail
Understanding of Internet physical structure
Understanding of search engines (e.g. www.google.com)
Understanding of the Internet browser (e.g. Explorer)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0

WorLD links for development
Pilot Project

What does this mean for you?

- You will learn about computers
- You will learn about the Internet
- You will learn about the world by doing projects using the Internet!

Program steps

- Computer introduction
- Software introduction
- Internet introduction
- Creating mail account
- Project introduction
- Get connected!

What is a computer?

- Computer is divided into two parts:
  - Hardware: The physical components of a computer together with devices that perform the input and output
  - Software: A set of computer instructions performed by the computer

Hardware

- **Input Devices:**
  Allows getting data into the computer.

  simple examples of input devices are keyboard and mouse

- **Output devices**
  - Shows the result after processing dat... -- information
    - Examples are screen, printer and speaker

Software

- **Hardware can not work without software, it needs software to think, reason or perform.**

Type of computer software

- **Operating system**: This is the most important software in the computer. It controls all other applications
- **Software applications:** Software created for a specific purpose e.g.
  - Msword for creating documents
  - PowerPoint for creating presentations

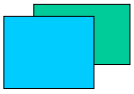
Windows

- The computers in front of you use the operating system:

Windows NT

Windows NT

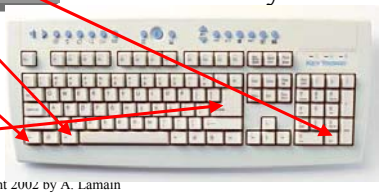
- Uses windows
- These can be piled on top of each other



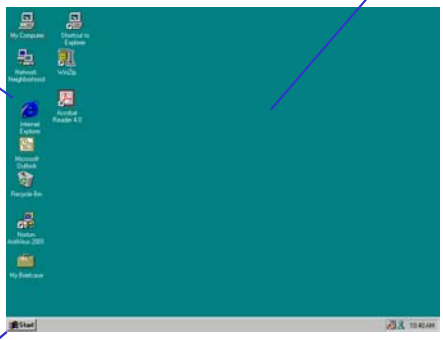
Windows allows you to run multiple applications at one time!

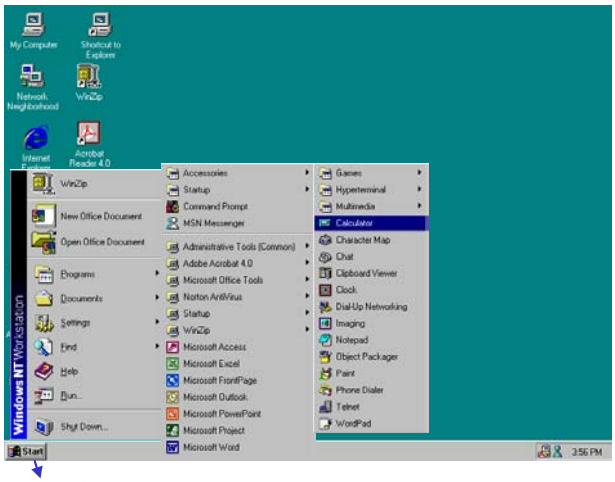
Exercise! Log on

- When a computer is used by multiple people, you need to log on.
- Logging on procedures:
- Press Ctrl - Alt - Del simultaneously
- Username:temp
- Password:temp
- Press enter



Getting Started With Windows





Learn by doing!

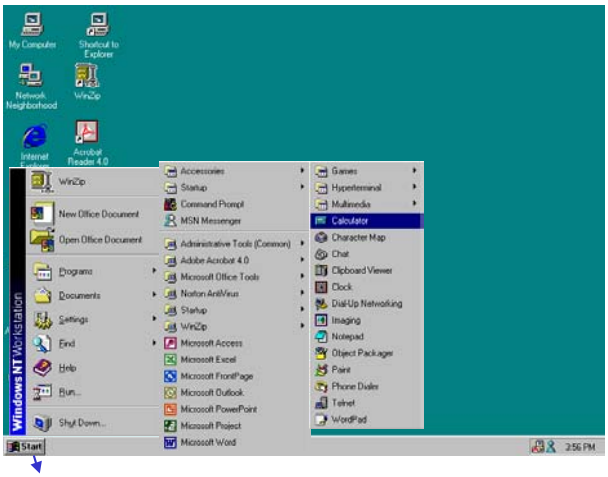
Take the mouse and move the cursor up and down by moving the mouse over the table!

cursor

Exercise! Open the calculator

Steps:

-go to: start
-Press left mouse button
-Go to: programs
-Go to: accessories
-Go to: calculator
-Press left mouse button
-This is what you get



Start button

Now calculate!

- 3452 x 23.4 = ?
- 456/678 = ?

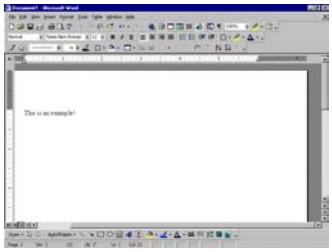
Answers

80776.8

0.6726

MSWord

- Word is a software application that allows you to:
  - Read documents
  - Write documents
  - Change documents



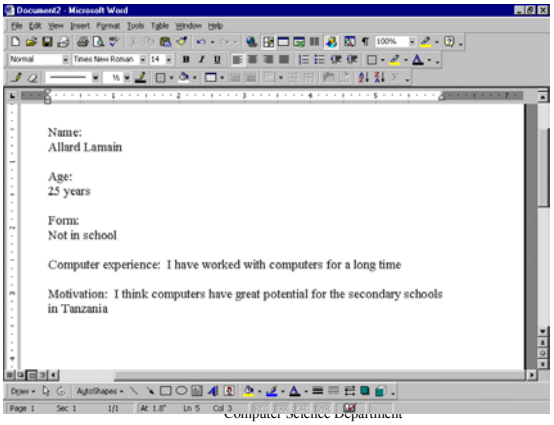
Exercise! Open Word

- Go to : start
- Go to: programs
- Go to: Microsoft word
- Click left mouse button!

Typing in word!

- Exercise Type the following:
- Name: {put your name here}
- Age: {put your age here}
- Form: {state what from you're in}
- Computer experience: {describe your computer experience}
- Motivation: {describe what you think computers can mean for the secondary education}
-

Example:

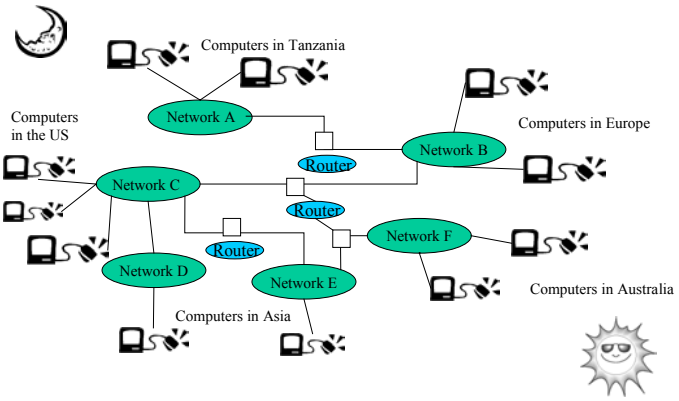


Computer Science Department

The Internet

What is the Internet?

The Internet is a vast network of computers from all over the world communicating with each other.



What do you need for Internet

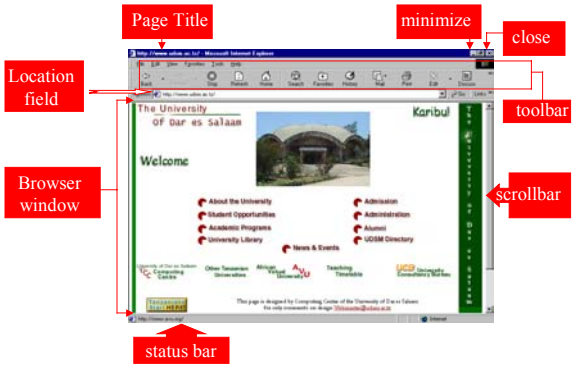
- Computer
- Browser
- Connection
- electricity

Internet browser

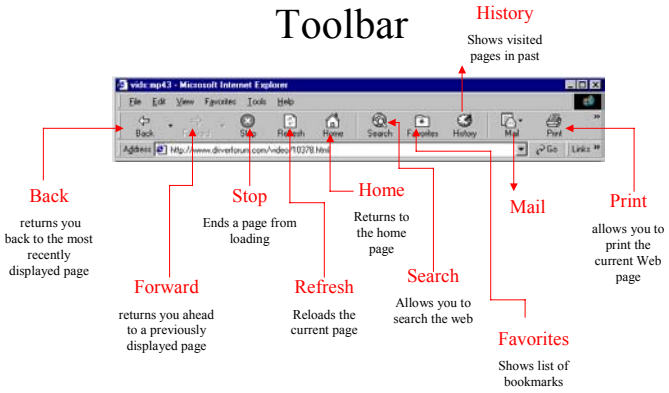
Internet explorer
ICON

Double click Icon with left mouse button

Internet Explorer components



Toolbar



Surfing the Web

•URL (Uniform Resource Locator)

–a unique global address that identifies a specific document on the Web

–each URL contains the following three components

`protocol://domain name/pathname`

–all URL's for Web sites begin with the protocol **http://**

•example URL: `http://www.dar-es-salaam.com/`

URL

www stands for World Wide Web

- www. … . Com (commercial)
- www. … . Tz (country = Tanzania)
- www. … . Org (organization)

Search engines

A program that searches documents for specified keywords and returns a list of the documents where the keywords were found

Examples of search engines

www.google.com

www.hotbot.com

Exercise!!

Open the Internet explorer

And go to the web page of Google.

url: google = www.google.com

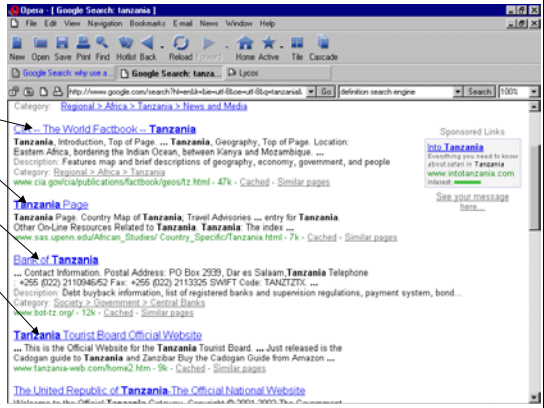
This is What you get!

Most used and best one

Put your keyword here

When using 'Tanzania' as search word, this is what we get

These are links to web pages



A link

When clicking on a link, you will be directed to that web page!

Tanzania Tourist Board Official Website

... This is the Official Website for the Tanzania Tourist Board. ... Just released is the Cadogan guide to Tanzania and Zanzibar Buy the Cadogan Guide from Amazon ...
www.tanzania-web.com/home2.htm - 9k - Cached - Similar pages

Under the link you see a short description what

The web page is about!

Exercise!!

- Answer the following questions (using the Internet as the information resource)

- What is the population of Dar es Salaam?
- What is population of Tanzania?

Answers!

- Population Dar es salaam =

Estimates between 2.3 and 3 million

- Population Tanzania = approximately

36 million

Search Exercise!

- **What is the capital of City of:**
- **Romania ?**
- **Sweden ?**
- **Luxembourg ?**
- **Belarus ?**
- **Netherlands ?**
- **Serbia/Montenegro (Yugoslavia) ?**
- **Georgia ?**
- **Moldova ?**
- **Liechtenstein ?**
- **Netherlands ?**
- **Andorra ?**
- **Bosnia-Herzegovina ?**
- **United Kingdom ?**
- **Ireland ?**
- **Monaco ?**

Create an E-mail account

Instructions are handed out

See instructions to create an account

Create an account

- Those that have an account already should help those that do not have an account yet!
- Advisable to open a Yahoo account.
- When created account send an email to me!

E-mail to Allard

- Address: alamain@cs.udsm.ac.tz
- Your e-mail should contain the following:
  - Answer to the question:

    We should have computers and Internet in our school because:
  - Ask me a question about computers and or internet (I will answer them or discuss them in class next time)

When creating an account

- Remember your personal ID and password!

Computer en Internet manual by Allard Lamain ©2002

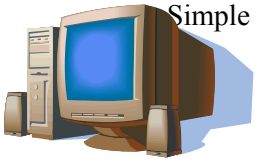
This computer and Internet manual is intended to get new computer users on the Internet as quickly as possible, since the Internet can be used to answer any question you might have. You can educate yourself by using the Internet. Crucial in this case is to know how to browse the Internet, by knowing the computer basics, and to know how to get the Information you want, by using search engines. So instead of asking a person (your friend, your teacher, your parents) about something (computers/biology/history/geography and so on) you can use the Internet. The Internet is the biggest information resource on the planet.

"Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon It." - Samuel Johnson

What is a computer?

Computer is divided into two parts: **Hardware** and **Software**

- **Hardware**: The **physical** components of a computer together with devices that perform the input and output
  - Input Devices: Allows getting data into the computer. Simple examples of input devices are keyboard and mouse
  - Output devices: Shows the result after processing data or information Examples are screen, printer and speaker

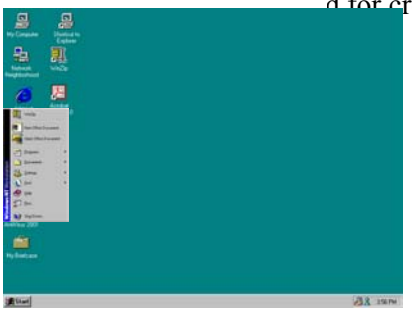


Input devices

Output devices

- **Software**: A set of computer instructions performed by the computer
  - Operating system: This is the most important software in the computer. It co other applications
  - Software applications: Software created for a specific purpose e.g. d for creating documents
    PowerPoint for creating presentations
    Internet Explorer for accessing the Internet

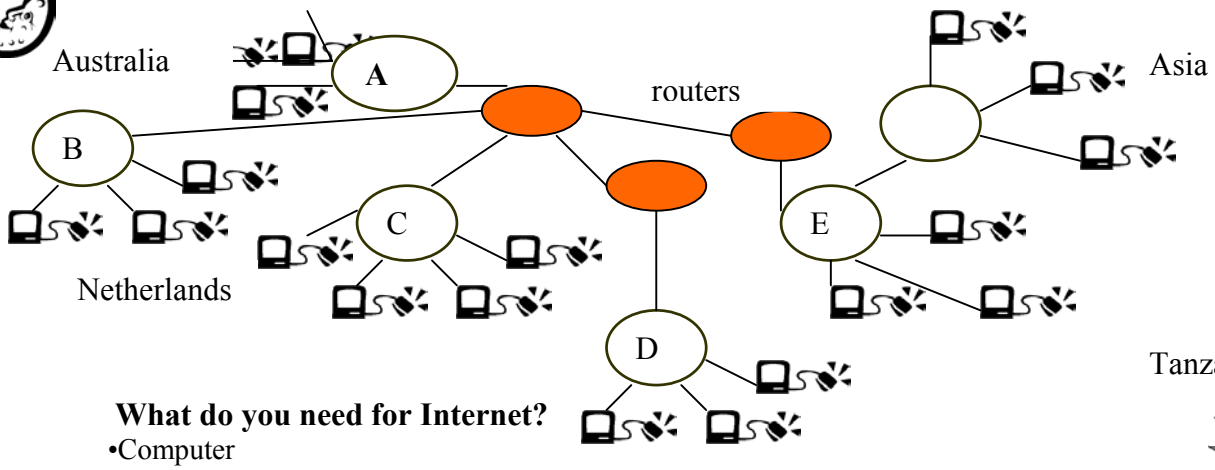
Operating system Windows



Applications

For more information on computers you can go to http://www.webopedia.com/
Or http://www.computeruser.com/resources/dictionary/dictionary.html

"The Internet is a vast network of computers from all over the world communicating with each other"



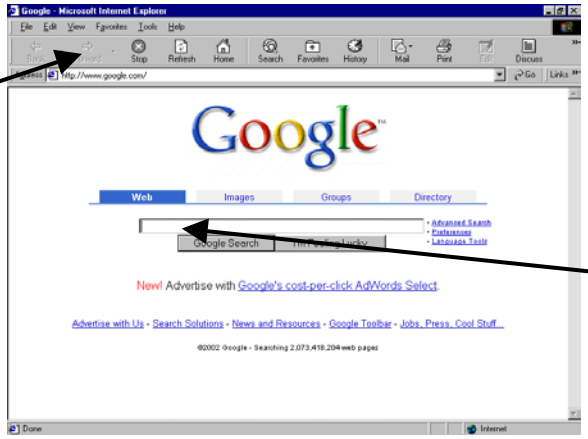
What do you need for Internet?

- Computer
- Browser
- Connection
- Electricity

Browser

For accessing the Internet you need a browser. This is an application specifically designed for surfing the web. **Internet Explorer** or **Netscape** are the two most used browsers. Double click on the Internet explorer ICON with the left mouse button to open the application.

Put page address here
e.g. **www.google.com**



Put your search KEY word(s) here

Search Engines

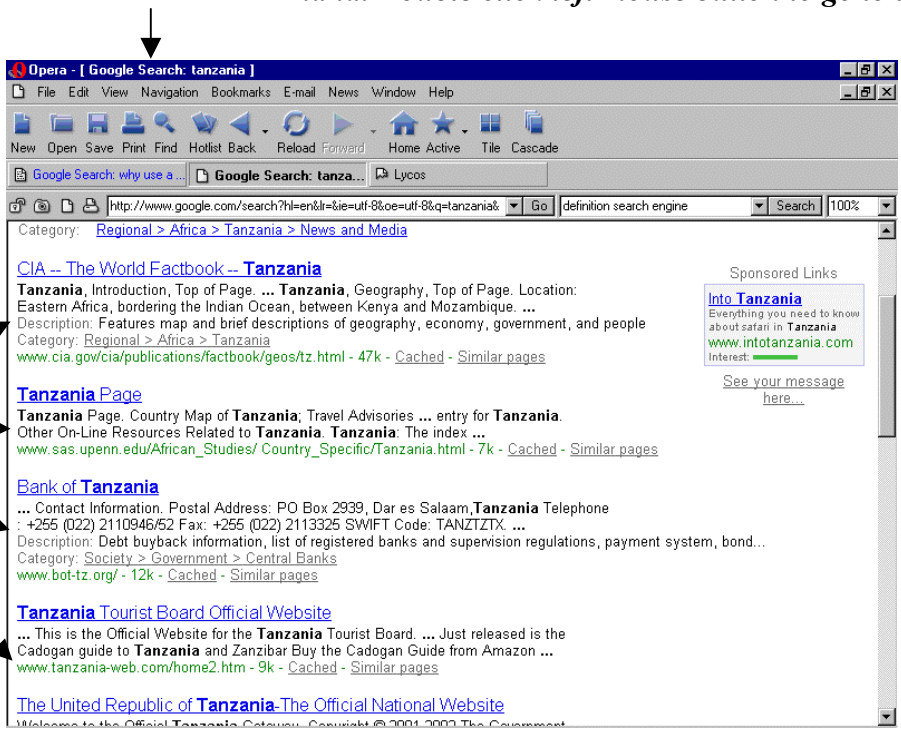
Since the Internet is so huge, we need a way to search through it to find what we are looking for. We use search engines to perform this task. Search engines are merely programs that scan through the massive number of web pages that are "out there", looking for some particular topic you have specified. Some common search engines are Yahoo, Webcrawler, Infoseek, Lycos, google and Excite. You can access these search engines by going to their web pages. Most used and best search engine is www.google.com

"A program that searches documents for specified keywords and returns a list of the documents where the keywords were found"

LINKS

After having searched the browser will present a list with links that direct you to the WebPages containing your search word. Example, when you search for "**Tanzania**" you will

get this. ***Each link is blue. When you put the curser on a link, it will change to the shape of hand. Double click left mouse button to go to that page.***



These are links to web pages. Under the link you find a short description of the page

What can you use the Internet for?

Browsing for Information - Topic related information - Jobs - Prices of products/services - Music - Movies - Pictures - People - News	E-mailing - Keeping contact with friend - Apply for jobs - Send pictures - Send e-cards	Chatting - With strangers - With friends - By script - By voice - By video
Publishing (Homepages) - Stories - Photos - Movies - Music	Business - Selling/buying things - Advertising - Teleconferencing	Much, much more… Discover it yourself!

E-mail

Before you can send or receive e-mail, you need to create an "e-mail account". This can be done at many sites that offer a "free e-mail account". You will wind these sites by searching using the key words "free e-mail" using any of the search engines. Popular free e-mail sites are www.hotmail.com and www.yahoo.com.

Signing up for e-mail account example

Step 1: **Go to** www.yahoo.com

Step 2: ***press on the Link "****check mail****"***
To create account, *or* ***to read your mail if you already have an account***

Step 3:

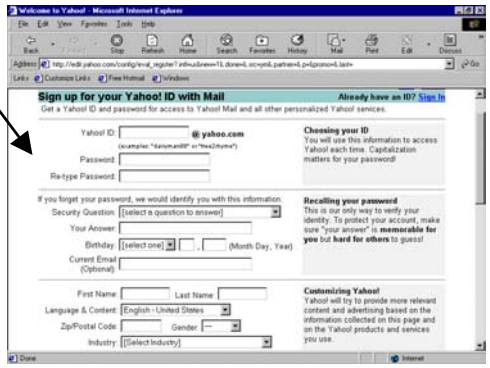
Sign in here if you have an account with your ID and password

Click here if you want to create account

Click "**inbox**" to read your mail, or "**compose**" to write a mail to your friends family etc..

Step 4:
Click here to sign up for free e-mail account

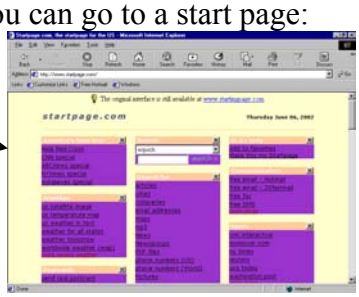
Step 5:
Fill in your information and press submit at the end of page



Note: Remember your ID and Password
This allows you to log on and read/write mail from anywhere on this planet.
Note: If you do not use your e-mail account for 90 days
Your account will be closed by Yahoo. But you can always sign up for a new one!

Where do you go from here?

Do you want to know more? Find it on the Internet. Examples:
If you want to know something about the history of computers you type in the search word "*history of computers*".
If you want to know more about the operating systems windows, search for "windows manual" or "*working with windows*".
If you just want to browse, but don't know where to start you can go to a start page:
www.startpage.com



For questions, see the Internet or mail me:
Allard@Lamain.nl

What is the Geo Game?

- geography internet game
  - Use the Internet as a resource
- Competition
  - Your school against other schools

Why this game?

- Learn about other places on this planet
- Learn about geographical terms
- Learn how to search the Internet effectively
- Increase awareness of geographical and cultural diversity

How to play the Game

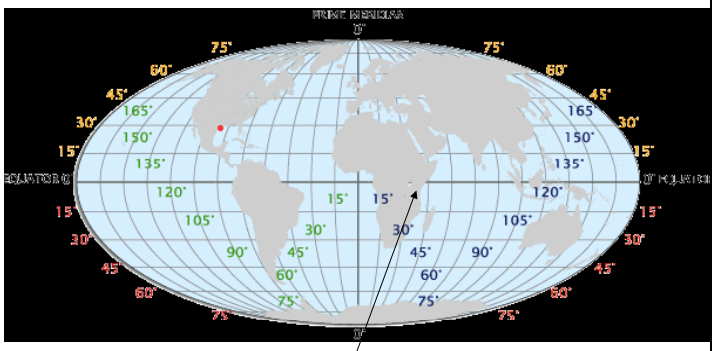
- You are given 10 clues about a place

1. **City URL**:
2. **Latitude**:
3. **Time Zone**:
4. **Population**:
5. **January Weather**:
6. **January Temperatures**:
7. **January Clothing**:
8. **Land Forms**: .
9. **Tourist Attractions**:
10. **Famous For**:

Clue 1. URL

Does the city have a URL?
URL= Unified resource locator
Means: does this city have a web page?
Example: www.dar-es-salaam.com

Clue 2. Latitude

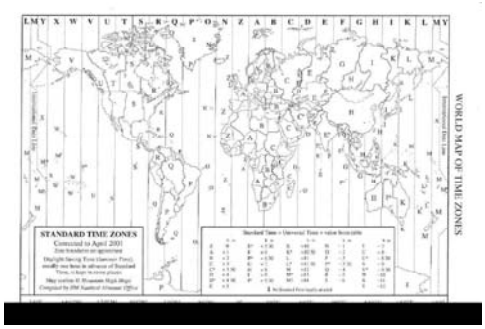


Dar es Salaam = 6.51 ° south

Clue 3. Time zone

- Standard time zone:

GMT = Greenwich Mean Time



Clue 4. population

- Population of the city, to get an idea of how big the city is.
  - Example: population Dar es Salaam is

2.3 million

Clue 5. January weather
Clue 6. January temperature
Clue 7. January clothing

Example

- January Weather: Wet and Cold with the average winter precipitation is 3.7 inches per month
- January Temperatures:(Average High, Low)
- high: 43 degrees F, low: 30 degrees F
- January Clothing:Jackets, sweaters, and rain gear

Clue 8. Land Forms

- Land forms describe the form of the land
  - Like; rivers, plains, hills, mountains, desert, lakes etc..

Clue 9. Tourist Attractions

- Why do tourist go to that city?
- Example Dar es Salaam
  - Proximity to wildlife national parks
    - Bagamoyo, Saadani, Mikumi

Clue 10. Famous For

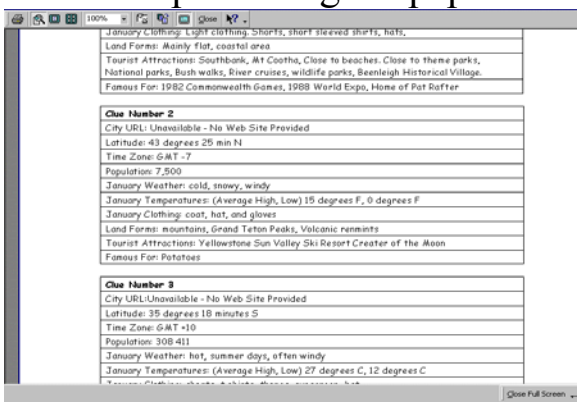
- What is the city famous for?
- Example Dar es Salaam
  - Julius k. Nyerere
  - TINGATINGA
  - Wood Carvings

Use these clue's

- Browse the Internet for these clues and find the city belonging to these clue's !
- Locate the city, and pinpoint it on the map!

Allard Lamain 'WorlD' pilot
Copyright 2002 CSD UDSM

Each pair will get a paper



Clue Number 2
City URL: Unavailable - No Web Site Provided
Latitude: 43 degrees 25 min N
Time Zone: GMT -7
Population: 7,500
January Weather: cold, snowy, windy
January Temperatures: (Average High, Low) 15 degrees F, 0 degrees F
January Clothing: coat, hat, and gloves
Land Forms: mountains, Grand Teton Peaks, Volcanic remnants
Tourist Attractions: Yellowstone Sun Valley Ski Resort Creater of the Moon
Famous For: Potatoes

Clue Number 3
City URL:Unavailable - No Web Site Provided
Latitude: 35 degrees 18 minutes S
Time Zone: GMT +10
Population: 308 411
January Weather: hot, summer days, often windy
January Temperatures: (Average High, Low) 27 degrees C, 12 degrees C

Backside of paper

City, State, Country	Clue Number
Barcelona, Province of Barcelona, Spain	
Batavia, Illinois, USA	
Cape Town, Western Cape, South Africa	
Clearwater, British Columbia, Canada	
Colorado Springs, Colorado, USA	

So how to go about?

- **step 1: Go to website of search engine**
- **step 2: Fill in search criteria**
- **step 3: Find a matching city**
- **step 4: pinpoint the location on the map (back of paper)**
- **step 5: fill in clue number**
- **step 6: repeat step 1 trough 6 until all clue's on your paper are finished**

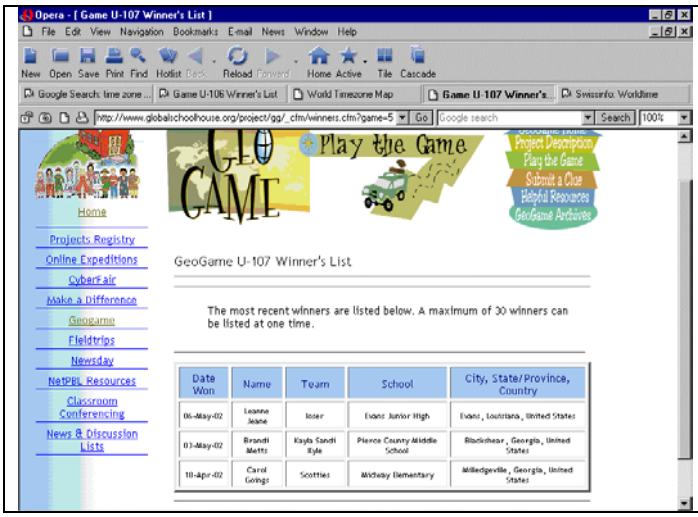
Final step: go to your fellow Students, to fill in the entire list!

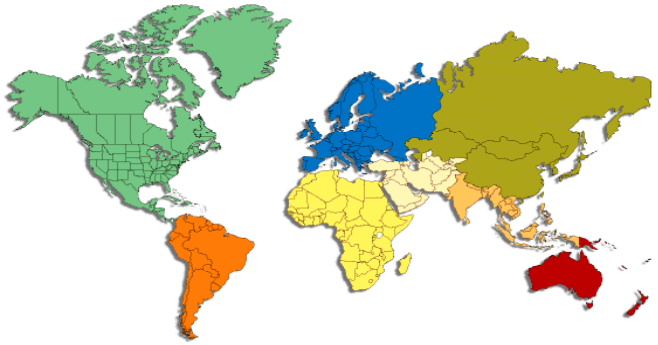
Allard Lamain 'WorlD' pilot
Copyright 2002 CSD UDSM

At the end

- Everyone should have a full list
- Everyone's list should be the same
- Then we fill it in on the Internet, to see if we won or not!!!!

Allard Lamain 'WorlD' pilot
Copyright 2002 CSD UDSM





Allard Lamain 'WorlD' pilot

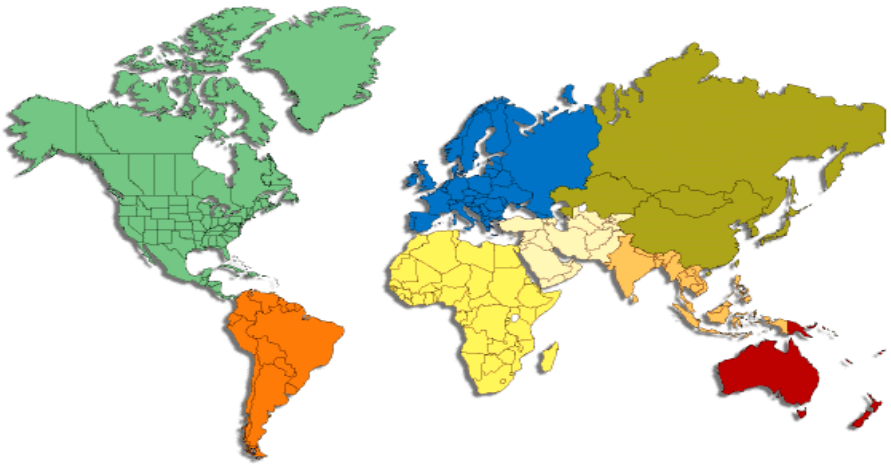
Appendix I: GEO Game example 'Clues'

Clue Number 1
City URL: This City has a Web Page
Latitude: 51 degrees 12 minutes North
Time Zone: GMT +1 hours
Population: 125,000
January Weather: The winter is cold, rainy and windy. Sometimes we get a lot of snow.
January Temperatures: (Average High, Low)
high: 35 degrees F, low: 22 degrees F
January Clothing: We wear pullovers, lined coats and firm boots.
Land Forms: The prominent landforms are many hills and some mountain ridges.
Tourist Attractions: Burg Castle, Muengsten Bridge, Roentgen Museum
Famous For: Tool-making, Peter Hasenklever, founder of the N.Y. chamber of comerce, Konrad Roentgen, inventor of the X-ray

Clue Number 2
City URL: This City has a Web Page
Latitude: 34 degrees 58 minutes North
Time Zone: GMT +9 hours
Population: 2,700,000
January Weather: Snowy and cold
January Temperatures: (Average High, Low) high: 20 degrees Celcius, low: 8 degrees Celcius
January Clothing: Snow jackets, mufflers and wool pants
Land Forms: canals
Tourist Attractions: Tokyo Tower, Mt. Fuji, The Ginza
Famous For: automobile industry, Sony, Mountains

Clue Number 3
City URL: This City has a Web Page
Latitude:37 dgrees 49 minutes south
Time Zone: GMT +12 hours
Population: 3,248,811
January Weather: Rainfall avg 50 mm. Snow on nearby mountain range. Heavy frosts and fog over bay. cold winds some warm days
January Temperatures: (Average High, Low)
high: 14 degrees Celsius, low: 2 degrees Celsius
January Clothing: Heavy warm clothes; jeans, jackets, jumpers, scarves, hats, gloves
Land Forms: mountain range to NE/ E, large bay to S, rivers
Tourist Attractions: Australian Open Golf and tennis, Australian Grand Prix, Street trams, Victorian Arts Center, National Gallery, Phillip Island Fairy penguin reserve. Royal Botanical gardens
Famous For: John Batman, Matthew Flinders, Fairy penguin colony, street trams, international arts festival, Australian sports and nightclub capital

Appendix J: GEO Game answer sheet example



City, State, Country	Clue Number
Amsterdam, North-Holland, Netherlands	
Bainbridge Island, Washington, USA	
Bethlehem, Pennsylvania, USA	
Birmingham, West Midlands, England	
Brisbane, Queensland, Australia	
Caledon, Ontario, Canada	
Calgary, Alberta, Canada	
Canberra, ACT, Australia	
Genoa, Liguria, Italy	
Johannesburg, Gauteng, South Africa	
Kirksville, Missouri, USA	
Madang, Madang, Papua New Guinea	
Shelley, Idaho, USA	
Singapore, Singapore, Singapore	
Sydney , NSW, Australia	
Tarakan, Kalimantan Timur, Indonesia	
Tokyo, Tokyo, Japan	
Wake Island, Wake Island, USA	
Waldheim, Saskatchewan, Canada	
Yigo, Guam, USA	

Team: Janguani Secondary School			
Name student:		Age:	
Name student:		Age:	
Name student:		Age:	

Appendix K: e-mail scheme letter from developing countries

ROM:Titus Mbeki
3/5 RIDER HAGGARD
CLOSE, JO, BORG
SOUTH AFRICA.
Tel/fax;{874}-762864168
PHONE#:(874)-762864167,

RE: TRANSFER OF ($ 126,000.000.00 USD)
ONE HUNDRED AND TWENTY SIX MILLION DOLLARS

Dear sir,

In order to transfer out (USD 126 MILLION) One hundred and twenty six million United States Dollars from DEVELOPMENT BANK FOR SOUTHERN AFRICA [DBSA]. I wish to ask you to quietly look for a reliable and honest person who will be capable and fit to provide either an existing bank account or to set up a new Bank a/c immediately to receive this money, even an empty a/c can also serve for this purpose. But if you can help me I will apprecite it.

I am Mr Titus Mbeki,the Auditor General of Development Bank For Southern Africa, during the course of our auditing I discovered a floating fund in an account opened in the bank in 1990 and since 1993 nobody has operated on this account again, after going through some old files, from the records I discovered that the owner of the account died without an heir hence the money is floating and if I do not remit this money out urgently it will be forfeited for nothing. The owner of this account is Mr. Allan P. Seaman, a foreigner, and an industrialist, and he died, since 1993 and no other person knows about this account or any thing concerning it, the account has no other beneficiary and my investigation proved to me as well that Allan P. Seaman until his death was the manager Diamond Safari [pty]. SA.

We will start the first transfer with Twenty Six Million [$26,000.000] upon successful transaction without any disappoint from your side, we shall re-apply for the payment of the remaining rest amount to your account,

I am only contacting you as a foreigner because this money cannot be approved to a local person here, but can only be approved to any foreigner with valid information about Mr. Allan P. Seaman who is a foreigner too.

However, I am revealing this to you with believe in God that you will never let me down when the money enters your A/C.

Send also your private telephone and fax number including the full details of the account to be used for the deposit

I need your full understanding and co-operation to make this work fine because the management of the Bank is ready to approve this payment to any foreigner who has correct information of this account, which I will give to you, upon your positive response. Two of us will fly to your country at least two days ahead of the money going into the account.

I will use my position and influence to obtain all legal approvals for onward transfer of this money to your account with appropriate clearance from the relevant ministries and foreign exchange departments for easy and smooth transfer of the fund into your account without question.

At the conclusion of this business, you will be given 35% of the total amount, 60% will be for me, while 5% will be for expenses both parties might have incurred during the process of transferring this money.

I am looking forward to hear from you.

Yours truly
Titus Mbeki

Appendix L: Post pilot questionnaire for students and teachers

Post **Pilot questions** Today's Date: _____

1 I am a ☐ student ☐ Teacher **from** ☐ Janguani Secondary School ☐ St Matthew's Secondary School
2 Age (students only) _____
3 Were you able to attend all sessions? ☐ Yes ☐ No
4 How many sessions did you not attend? _____
5 What were the reasons for NOT attending? .....

Computer Understanding questions:

Please rate your understanding level of the following:

	Keyboard	none	poor	average	good	very good
6	Understanding the function of the cursor	☐	☐	☐	☐	☐
7	Using the keyboard to type words and sentences	☐	☐	☐	☐	☐
8	Using the delete and backspace buttons to correct mistakes	☐	☐	☐	☐	☐
9	Using the 'shift' button and 'caps lock' for capital letters	☐	☐	☐	☐	☐
10	Using the navigation arrows to move through the words and lines	☐	☐	☐	☐	☐

	Mouse	none	poor	average	good	very good
11	Understanding of the mouse pointer and navigation over the screen	☐	☐	☐	☐	☐
12	selecting an object with the mouse	☐	☐	☐	☐	☐
13	Being able to "click and drag"; move an object	☐	☐	☐	☐	☐
14	Using the right mouse button	☐	☐	☐	☐	☐
15	Double-clicking an object	☐	☐	☐	☐	☐

	Opperating system and applications	none	poor	average	good	very good
16	loging on	☐	☐	☐	☐	☐
17	Understanding of Icons, Buttons, toolbars and their function	☐	☐	☐	☐	☐
18	Understanding the desktop including toolbars, menus and icons	☐	☐	☐	☐	☐
19	Being able to start a program, use it and close it	☐	☐	☐	☐	☐
20	Using several screens on top of each other (the windows)	☐	☐	☐	☐	☐
21	Being able to maximise, minimise, move and close a screen	☐	☐	☐	☐	☐
22	Scrolling through a document which consists of more than one page	☐	☐	☐	☐	☐

	Internet Questions	none	poor	average	good	very good
23	Understanding of the Internet browser (e.g. Explorer)	☐	☐	☐	☐	☐
24	Understanding of search engines (e.g. www.google.com)	☐	☐	☐	☐	☐
25	Understanding of Internet physical structure	☐	☐	☐	☐	☐
26	Understanding of E-mail	☐	☐	☐	☐	☐
27	Understanding of Chatting	☐	☐	☐	☐	☐
28	Understanding of 'links'	☐	☐	☐	☐	☐

29 Did you have an e-mail account before the pilot? ☐ Yes ☐ No

Please indicate whether and where the World pilot fell short of, exactly met, or exceeded your expectations:

	fell short of			exactly met expactations			exceeded expectations
	-3	-2	-1	0	1	2	3
32 Computer Lab	☐	☐	☐	☐	☐	☐	☐
33 Internet connection	☐	☐	☐	☐	☐	☐	☐
34 Nr of sessions	☐	☐	☐	☐	☐	☐	☐
35 Time per session	☐	☐	☐	☐	☐	☐	☐
36 Teaching quality	☐	☐	☐	☐	☐	☐	☐
37 Teaching speed	☐	☐	☐	☐	☐	☐	☐
38 Subjects	☐	☐	☐	☐	☐	☐	☐

World Pilot questions:

39 Do you have any interest in computers in general or for your (future) career? ☐ Yes ☐ No

40 Do you think you will be using the knowledge obtained in the WorLD pilot in the near futu ☐ Yes ☐ No

41 Do you think you will go to internet café's more often? ☐ Yes ☐ No

42 To do what? ☐ E-mail ☐ chat ☐ Surf ☐ search for specific info ☐ Other .....

43 Do you think you will teach your friends/ tamilly about computers/ the Internet? ☐ Yes ☐ No

44 What did you like the most about the WorLD pilot? (please name at least three points)

.....

.....

.....

45 What did you NOT like about the WorLD pilot? (please name at least three points)

.....

.....

.....

46 Please rate your level of interest for the following (1 meaning no interest at all, 7 being very interested and that you would like to learn more about this topi

	1	2	3	4	5	6	7
Computer history	☐	☐	☐	☐	☐	☐	☐
Computer basics	☐	☐	☐	☐	☐	☐	☐
Typing	☐	☐	☐	☐	☐	☐	☐
Windows	☐	☐	☐	☐	☐	☐	☐
Msword	☐	☐	☐	☐	☐	☐	☐
Internet physical structure	☐	☐	☐	☐	☐	☐	☐
Internet applications	☐	☐	☐	☐	☐	☐	☐
Search engines	☐	☐	☐	☐	☐	☐	☐
e-mail	☐	☐	☐	☐	☐	☐	☐
Chatting	☐	☐	☐	☐	☐	☐	☐

Other .....

47 What do you think the WorLD program can mean for your school?

.....

.....

.....

48 What are your general thoughts on the WorLD program?

.....

.....

.....

49 Please describe in a few words what you have learned!

.....

.....

.....

50 I am ☐ male ☐ female

Thank you very much!

Allard Lamain